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2 Patent Application of  
3 Michael Fitzpatrick  
4 for

5 FOOD PRODUCTS CONTAINING WHOLE CHIA SEED OR A GLUTEN-FREE  
6 AGGLUTINANT DERIVED THEREFROM AND METHODS OF MAKING SAME

7 1.0 RELATED APPLICATION

8 This application is a continuation-in-part of a previous  
9 application filed in the United States Patent and Trademark  
10 Office by Michael Fitzpatrick on Dec. 23, 2000, titled "*Food*  
11 *Products Containing Whole Chia Seed or a Gluten-free*  
12 *Agglutinant Derived Therefrom and Methods of Making Same*" and  
13 assigned serial number 09/745,924, now abandoned, which was a  
14 continuation-in-part of a previous application filed in the  
15 United States Patent and Trademark Office by Michael  
16 Fitzpatrick on Sept. 21, 1999, titled "*Food Products*  
17 *Containing a Gluten-free Agglutinant Derived from Whole Chia*  
18 *Seed, and Methods of Making Same*" and assigned serial number  
19 09/400,722 (abandoned), which was a continuation-in-part of a  
20 previous application filed in the United States Patent and  
21 Trademark Office by Michael Fitzpatrick on Jan. 20, 1998,  
22 titled "*Food Products Containing a Gluten-free Agglutinant*

Derived from Whole Chia Seed, and Methods of Making Same" and assigned serial number 09/009,826 (abandoned), which was a continuation-in-part of a previous application filed in the United States Patent and Trademark Office by Michael Fitzpatrick on Oct. 3, 1996, titled "Food Products Containing a Gluten-free Agglutinant, Derived from Whole Chia Seed, and Methods of Making Same" and assigned serial number 08/724,761 (abandoned), which was a continuation-in-part of a previous application filed in the United States Patent and Trademark Office by Michael Fitzpatrick on Sept 1, 1995, titled "Food Products Containing the Gluten-free Agglutinant, Whole Chia Seed, and Methods of Making Same" and assigned serial number 08/523,050 (abandoned), which was a continuation-in-part of U.S. Application Ser. No. 08/237,250, filed May 4, 1994 and titled "Food Products Containing the Gluten-free Agglutinant, Whole Chia Seed, and Methods of Making Same" (abandoned), which was a continuation-in-part of U.S. Application Ser. No. 07/878,668, filed May 5, 1992 and titled "Food Products Containing the Gluten-free Agglutinant, Whole Chia Seed, and Methods of Making Same" (abandoned).

## 2.0 TECHNICAL FIELD

The present invention relates in general to snack food products in which one of the ingredients is a gluten-free agglutinant, and more particularly to such snack food products in which that gluten-free agglutinant is nonpasteurized whole (i.e., not ground) chia seed or is derived therefrom. The invention further relates to methods of making such snack food products.

## 3.0 BACKGROUND ART

Before the invention of this patent application, most

1 snack foods were held together by gluten, by the gluten in  
2 ground up gluten-containing grains, or by the agglutinating  
3 properties of sweeteners. Since some people are allergic or  
4 sensitive to gluten, and others have to restrict their use of  
5 sweeteners, they have hitherto been unable to enjoy many  
6 snack foods. Some raw sprouted snack foods were held together  
7 by the mucilaginous properties of ground flaxseed or ground  
8 chia seed.

9 In searching the background art for products in which a  
10 gluten-free mucilaginous seed such as chia seed, flaxseed, or  
11 psyllium is one of the ingredients, Applicant came up with  
12 the following:

13 On pages 265-266 of *Raw Energy* (Warner Books, Inc., 666  
14 5<sup>th</sup> Ave., New York, NY, 1984), Kenton et al (Kenton) teaches a  
15 sprouted grain crisp (pg. 265). Kenton teaches that any kind  
16 of grain sprout (germinated grains) can be used to produce a  
17 cracker like food product/crisp product (pg. 265), as long as  
18 the sprouted grains are ground "as finely as possible in the  
19 food processor." Kenton teaches that the resultant product  
20 makes a great snack. Kenton takes the sprout product and  
21 thoroughly grinds the product in a food processor. After  
22 processing the sprouts into a dough, the dough can then be  
23 dried (pg. 266). In addition, Kenton teaches that additional  
24 ingredients such as honey, carob powder, and dried fruit can  
25 be added to food products. Although Kenton teaches that any  
26 grain can be used in the crisp product, Kenton is silent as  
27 to the specific grains, although Kenton does mention with  
28 respect to these products, that they must be ground as finely  
29 as possible, most likely, because unless they are ground as  
30 finely as possible, the products will not only not hold  
31 together well but also one might chip a tooth on the hard  
32 dried sprouts therein.

1           It should be mentioned, that although Kenton teaches a  
2 chia containing food product, the references noted above are  
3 silent as to the water activity of the product. On pages 103-  
4 104 of *Water Activity and Food* (Academic Press), Troller et  
5 al (Troller) teaches that it is essential to regulate the  
6 water activity of a food product to prevent microbial growth  
7 on the food product. By inhibiting microbial growth, one can  
8 prevent giving the consumer food poisoning. It also should be  
9 mentioned that although it might seem obvious to make a  
10 product such as Kenton's with whole chia seed rather than  
11 ground chia seed and with a sufficiently low water activity  
12 to prevent mold, without actually making this food product,  
13 it can not be known a priori whether the whole chia seeds in  
14 such a food product would be so hard as to break a tooth in  
15 the one consuming it.

16           On page 41 of *Common & uncommon uses of HERBS for*  
17 *HEALTHFUL LIVING* (Arco Publishing, Inc., 219 Park Avenue  
18 South, New York, NY), Richard Lucas (Lucas) teaches:

19           "It is difficult for the body to assimilate any kind of  
20 seeds in their whole form. For this reason chia seeds  
21 are ground or soaked before using and can be added to  
22 the diet in a number of different ways. For example, a  
23 mucilaginous drink may be prepared by steeping a single  
24 teaspoonful of the seeds in a tumblerful of cold water  
25 for 12 hours (overnight). This beverage is ready for use  
26 by morning and may be sweetened with honey. From one to  
27 one-and-a-half teaspoons of the ground seeds may be  
28 sprinkled over salads or mixed with salad dressing; it  
29 can also be stirred into a bowl of soup into a cup of  
30 cottage cheese; a half teaspoonful can be added to  
31 scrambled eggs just before the eggs are removed from the  
32 skillet. As a spread, it may be mixed with margarine or  
33 butter. From one to one-and-a-half teaspoons of the





1 to having whole dried chia seeds. Since never before had a  
 2 dry food product contained whole unground chia seed, it could  
 3 not be known *a priori* whether such a food would hold together  
 4 well, or would shatter into a thousand pieces at the  
 5 slightest touch. Even if it were known that foods containing  
 6 ground chia would be held together by the agglutinative  
 7 properties of *ground* chia, one would not be able to logically  
 8 extrapolate to the agglutinative properties of whole  
 9 *nonground* chia seeds. Until one actually makes a dry food  
 10 product containing whole *unground* chia seeds and examines its  
 11 properties, one cannot *a priori* state what those properties  
 12 might be. I, for example, sincerely believed, based upon  
 13 previous experience with and research on chia seeds, that if  
 14 a dry product were produced in which whole chia seeds were  
 15 the only ingredient, it would be so fragile that it would  
 16 crumble at the slightest touch.

17 On pages 72 and 73 of *The UNcook Book* by Elizabeth and  
 18 Dr. Elton Baker (Drelwood Publications 1980, Distributed by  
 19 Communication Creativity, Saguache, CO 81149), the suggested  
 20 uses for chia seed sprouts are "soups, dips, spreads". The  
 21 recipe for rolled tacos on page 105 lists flaxseed meal or  
 22 chia seed meal as one of the ingredients and mentions that a  
 23 rather stiff paste can be formed from the ingredients.

24 Just before the recipe for Wheat Crackers on page 111, the  
 25 following statement appears: "All crackers can be made  
 26 without flaxseed meal. However, for a crisper, noncrumbling  
 27 cracker, add 2 or 3 tablespoons of flaxseed meal and a few  
 28 teaspoons of water to the dough." The recipe for Wheat  
 29 Crackers is then given as follows:

| 1  | Ingredients  | Method                            |
|----|--|-----------------------------------|
| 2  | 2 cups wheat berries   | Grind fine (4 cups sprouted       |
| 3  |  | wheat), work into a dough, with   |
| 4  | 1 teaspoon salt (optional)                                   | or without salt, and then add     |
| 5  |  | soak water or plain water to make |
| 6  | Soak water* or plain water                                   | a very thick cream. (This can be  |
| 7  |  | made in a blender.) Cover a large |
| 8  | Sprout wheat berries for                                     | cookie sheet with wax paper, or   |
| 9  | 24 hours (yields approx.                                     | cellophane, and spread dough over |
| 10 | 4 cups sprouted wheat).                                      | all. Dehydrate at 100 F (38 C) in |
| 11 | a  |                                   |
| 12 |  | dehydrator or in a preheated,     |
| 13 | * Soak water is the water                                    | turned-off oven. Mark in squares  |
| 14 | in which grain has been                                      | when half dry. When crisp, break  |
| 15 | soaked prior to sprouting                                    | into squares and store in a       |
| 16 | it. It is reputed to con-                                    | sealed container in a cool, dry   |
| 17 | tain minerals and enzymes.                                   | place. Wheat crackers are more    |
| 18 |  | sturdy because of the gluten in   |
| 19 |  | the grain.                        |
| 20 | Then on p. 112, the recipe for Rye Crackers is given as      |                                   |
| 21 | follows: "Use the same recipe as for Wheat Crackers, but use |                                   |
| 22 | sprouted rye and add ½ cup chia or flaxseed meal and ½ cup   |                                   |
| 23 | water. (The seed meal keeps the crackers from crumbling.)"   |                                   |
| 24 | Also on p. 112, the recipe for Rice Crackers is given as     |                                   |
| 25 | follows: "Use the same recipe as for Wheat Crackers,         |                                   |
| 26 | substituting sprouted rice for sprouted wheat and add ½ cup  |                                   |
| 27 | chia seed and ½ cup water."                                  |                                   |
| 28 | The full recipe for Rice Crackers would therefore be:        |                                   |

| 1  | Ingredients                | Method   |
|----|----------------------------|--|
| 2  | 2 cups rice                | Put the sprouted rice, the chia, and ½ cup of water into the   |
| 3  |                            |  |
| 4  | 1 teaspoon salt (optional) | bowl of a food processor with or without the added salt. Grind |
| 5  |                            |  |
| 6  | ½ cup chia and ½ cup       | fine, and work into a dough.                                   |
| 7  | water                      | Then add soak water or plain                                   |
| 8  |                            | water to make a very thick cream.                              |
| 9  | Soak water or plain water  | (This can be made in a blender.)                               |
| 10 |                            | Cover a large cookie sheet with                                |
| 11 | Sprout rice for 24 hours   | wax paper, or cellophane, and                                  |
| 12 |                            | spread dough over all. Dehydrate                               |
| 13 |                            | at 100 F (38 C) in a dehydrator or                             |
| 14 |                            | in a preheated, turned-off oven.                               |
| 15 |                            | Mark in squares when half dry.                                 |
| 16 |                            | When crisp, break into squares                                 |
| 17 |                            | and store in a sealed container                                |
| 18 |                            | in a cool, dry place.  |

19       The recipes for Oat Crackers and Barley Crackers also on  
 20 page 112 list flaxseed and chia seed meal as optional  
 21 ingredients and mention that when these are used, a sturdier,  
 22 richer cracker results.

23       In the recipe for seed butter on page 118, the ingredients  
 24 are given as "1 cup seeds ground to fine meal", and "4 to 6  
 25 tablespoons water (sunflower and pumpkin take less water,  
 26 sesame more, flaxseed the most)". The instructions given are:  
 27 "Mix meal and water, adding liquid until desired thickness.  
 28 Flaxseed butter will thicken much in a few minutes. We season  
 29 flaxseed and sesame butters with soaked and drained celery  
 30 seed, caraway, or dill, for instance." On page 154, chia seed  
 31 yogurt is mentioned as a variation of flaxseed yogurt.

1       The cracker recipes involving either flaxseed or chia seed  
2 all call for the ingredients to be ground in a food  
3 processor. When this is done, the resultant batter will not  
4 keep for more than a few hours before it starts to sour. And  
5 since all the above cracker recipes call for the batter to be  
6 spread on cookie sheets, the batter will dry unevenly  
7 —quickly at the surface which is exposed to air and more  
8 slowly on the bottom where the batter comes in contact with  
9 the cookie pan. This is undesirable as it not only causes the  
10 top surface of the batter to have a different appearance and  
11 color than the bottom surface of the batter and, most likely,  
12 contributes to the large cracks which form in the batter as  
13 it dries, but it also greatly slows drying time with a  
14 resultant increase in bacterial souring. Further the dried  
15 batter tends to stick to the cookie sheet making removal of  
16 the batter difficult.

17       Thus, although, Baker teaches that chia seeds and water  
18 can be added to the cracker in order to strengthen the  
19 cracker (The UNcook Book, pg. 112), Baker emphasizes that it  
20 is chia seed meal which should be used, not whole chia seed.  
21 It should be emphasized that although one might be fully  
22 knowledgeable about the characteristics of ground chia seed,  
23 one would not be able to extrapolate as to whether and how  
24 whole chia seed could be used without actually trying it and  
25 noticing the results.

26       Since none of the methods for the above products  
27 utilizes whole chia seed in the batter to be dehydrated, it  
28 would not be known from those methods whether whole chia seed  
29 or an agglutinant derived therefrom could be used as an  
30 agglutinant to hold products together. Further, it also would  
31 not be known that a batter in which whole chia seed was the  
32 agglutinant could be prepared in such a way that the batter,

1 when spread on dehydrator screens, would not leak through and  
2 thus could be dried on both sides simultaneously, thus not  
3 only greatly speeding up the drying process but also greatly  
4 increasing the product yield from each dehydrator tray.  
5 Further, when the above products which utilize chia seed meal  
6 are dehydrated, the ground up chia seed tends to sour due to  
7 the long time that lactic acid bacteria act on the moist  
8 ground up chia seed before the water activity of the batter  
9 is reduced below 0.60. (Bacterial activity will no longer  
10 take place when the water activity of the product falls below  
11 0.60.) The term "water activity" ( $a_w$ ) is used throughout this  
12 specification and in the appended claims in its usual context  
13 to mean the ratio of the fugacity of water in the system  
14 being studied ( $f$ ) to the fugacity of pure water ( $f_0$ ) at the  
15 same temperature. Hence, the water activity of pure water is  
16 1.00. The water activity of the products and compositions  
17 herein can be measured using well-known physical chemical  
18 techniques and commercially available instruments.)

19 It should also be noted here that the methods presented by  
20 Baker do not recognize the differences in the absorbent  
21 properties of flax-seed and chia seed. As it turns out they  
22 are not even close equivalents in their water absorption  
23 capabilities. Applicant ran experiments to determine the  
24 water absorption capability of flax-seed, chia seed, and  
25 psyllium (which like flaxseed and chia seed also has a  
26 mucilaginous seed coat). Summarizing the experiments, one  
27 ounce of flaxseed absorbed 2.1 ounces of water; one ounce of  
28 psyllium absorbed 11.8 ounces of water; and one ounce of chia  
29 seed absorbed 12.0 ounces of water. (It should be mentioned  
30 that chia seeds from a later purchased bag of chia were found  
31 to absorb about 16 ounces of water per ounce of chia seeds.)  
32 It is seen then that chia seed is nearly 6 times as efficient  
33 in absorbing water as flax-seed. Some crackers were made with

1 whole psyllium but these were difficult to chew, the seed  
2 coat of psyllium not only being very hard but also  
3 indigestible as well. In addition, some people are extremely  
4 allergic to psyllium seed. Similarly crackers made with whole  
5 flaxseed were difficult to chew due to the hard seed coat and  
6 the much larger size of the flax seed. (Chia seed, by  
7 comparison, is a very small seed and has a very soft seed  
8 coat.) In addition, crackers made with whole flaxseed do not  
9 hold together well.

10 The background art teaches various methods of making  
11 crackers from sprouted gluten-containing grains and seeds.  
12 Perhaps the earliest method and one which is representative  
13 of all those later methods which utilize the gluten in  
14 gluten-containing grains to hold products together is found  
15 in the third century manuscript *The Essene Gospel of Peace*  
16 which was translated into English in 1928 by Edmond Bordeaux  
17 Szekely (International Biogenic Society, B.C., Canada  
18 (1981)). The method for making raw sprouted crackers taught  
19 by this manuscript (pages 40-41 of the English translation)  
20 is as follows:

- 21 (1) Sprout wheat for about 12 hours.
- 22 (2) Crush the sprouted wheat to paste consistency.
- 23 (3) Make thin wafers out of this sprout paste.
- 24 (4) Set these wafers in the sun to dry.

25 There are a number of disadvantages to this method:

- 26 1. Unless a cracker has significant gluten, it will not hold  
27 together. Unfortunately some people are allergic to  
28 gluten which prevents them from enjoying raw sprouted  
29 grain crackers. In addition, gluten is a notoriously  
30 difficult protein for many people to digest. Although

honey can be used as a type of an agglutinant, excessive honey is not conducive to good health.

2. When a gluten-containing sprouted grain is used as the agglutinant, it is necessary to first grind the sprouted grain in a food processor in order to make the gluten in the grain available for agglutinating purposes. The nutrients in the grain which were shielded from oxidation by the seed coat of the grain, are thus now exposed to oxidation when the grain is ground causing the loss of some of those nutrients. Further, a considerable amount of electrical energy is expended in grinding the grain. And, if one is not careful, the grain will overheat as it is being ground leading to the destruction of some of its heat sensitive nutrients.

3. Further, when these sprouted grains are ground into a paste, and this paste is formed into wafers, these wafers are now subject to the action of lactic acid bacteria. While these wafers are drying, the bacteria which were on the surface of the wheat sprouts are now in the raw sprout paste, fermenting it and imparting a sour taste to it. The pH drop due to lactic acid souring,  $\delta pH_{LA}$ , for crackers made from this sprout paste, determined as outlined in §4.1, is about 1.4. This 1.4 pH drop is due to lactic acid formation in the sprout paste as it dried. Furthermore, due to the thinness of the batter, large drying surfaces are required to produce an appreciable amount of these sprout wafers. (Due to its high gluten content, the resultant crackers are very hard and tend to cut up the inside of one's mouth as they are chewed due to their sharp, hard edges. If, on the other hand, the drying is stopped before the water activity of the crackers drops below 0.60 in order to yield softer



1       crackers, they have a tendency to mold, and their shelf  
2       life is only about a week in the refrigerator.)

3       Applicant formerly included a large percentage of wheat  
4       sprouts in the crackers he made, because wheat is high in  
5       gluten, and crackers made with wheat sprouts as a major  
6       ingredient hold together well. Applicant, however, noticed  
7       that when these crackers were fully dehydrated, they were  
8       very hard, and one had to use extreme care when eating them  
9       to avoid cutting up the inside of one's mouth. Consequently,  
10      Applicant began including whole hulled sesame seed which is a  
11      relatively soft seed in his cracker batter. Not only is  
12      sesame seed a relatively soft seed but also the sesame seed  
13      dilutes the gluten-containing wheat. As a result the  
14      resultant crackers crumble more easily, are somewhat softer,  
15      and are less likely to cut up the inside of one's mouth when  
16      they are being eaten. In his search for other soft seeds  
17      besides sesame seed which he might incorporate in his  
18      crackers, Applicant experimented with hulled sunflower seeds,  
19      caraway seeds, fennel seeds, and chia seeds, each of which is  
20      relatively soft and has a mild taste.

21      In order to properly discuss Applicant's early  
22      experimental use of whole chia seed in food products, it is  
23      first necessary to introduce the terms Whole Chia Seed  
24      Fraction of Agglutinants, CFA, and Majority Agglutinant  
25      Amount, MAA. If C is the weight of whole chia seed in a given  
26      amount of a food product and GCI is the weight of  
27      gluten-containing ingredients in the product, then the Whole  
28      Chia Seed Fraction of Agglutinants, CFA, is  $C / (C + GCI)$ .  
29      Essentially CFA is a measure of the portion of the burden of  
30      agglutinating the food product which is being borne by the  
31      whole chia seed in the food product. If CFA = 1, the entire  
32      burden of agglutinating a product is being borne by the whole

1 chia seed in the food product. If, however, CFA = 0.50, the  
2 agglutinative burden is equally borne by the whole chia seed  
3 and by the gluten-containing ingredients in the food product.  
4 And if CFA = 0, the entire burden of agglutinating the food  
5 product is being borne by the gluten-containing ingredients  
6 in the food product. As will be shown, none of Applicant's  
7 early products with whole chia seed had a CFA higher than  
8 0.5. Since none of the other background art products uses  
9 whole chia seed as an agglutinant to hold a food product  
10 together, the CFA of all the other background art products,  
11 is, by definition of CFA, 0. Similarly, a Majority  
12 Agglutinant Amount of chia seed is an amount of whole chia  
13 seed in excess of GCI. When whole chia seed is added to an  
14 aqueous mixture of other ingredients in a Majority  
15 Agglutinant Amount, more than half of the burden of  
16 agglutination will be borne by the whole chia seed and less  
17 than half the burden of agglutination will be borne by any  
18 gluten-containing ingredients present in the aqueous mixture.

19 One day Applicant planned to make a cracker which would  
20 consist of one part by weight wheat sprouts, one part by  
21 weight sesame seed, one part by weight chia seed, one tenth  
22 part by weight kelp powder, one twentieth part by weight  
23 spirulina powder (which has a bright green color), and  
24 one-twentieth part by weight enzyme powder. Using the above  
25 formula for CFA, the Whole Chia Seed Fraction of  
26 Agglutinants, CFA = 0.50. By the time of the making of these  
27 crackers, the evolution of the methods used to make his  
28 sprouted grain crackers had progressed to the point where  
29 Applicant would customarily prepare an aqueous slurry from  
30 the milled wheat sprouts and all the other ingredients except  
31 for the sesame seed. This slurry was very thin which enabled  
32 the various ingredients to be very thoroughly mixed together.  
33 Now that the wheat sprouts and other ingredients had been

1 thoroughly mixed together, Applicant would stir in whole  
2 hulled sesame seed, making a somewhat thicker but still quite  
3 thin slurry which he would then pour on dehydrator solid  
4 sheets in order to dehydrate it. Therefore on this occasion,  
5 Applicant prepared a slurry from wheat sprouts, spirulina  
6 powder, and kelp powder and then poured in whole chia seed.  
7 Unexpectedly, the mixture became so thick that Applicant was  
8 unable to add any sesame seed at all. Further, the chia seed  
9 conglomerated and solidified into many large clumps in the  
10 batter which frustrated any attempt to evenly disperse the  
11 chia seed throughout the batter. Consequently Applicant also  
12 had great difficulty spreading the batter on the dehydrator  
13 solid sheets. (While, perhaps, this mixture may have been  
14 thick enough to have been spread on dehydrator screens, that  
15 thought did not occur to Applicant.) As the mixture on the  
16 dehydrator sheets dried, it developed large and deep  
17 unsightly cracks all over its surface, and numerous clumps of  
18 chia seed could be seen in the final product. (At the time,  
19 Applicant believed that the reason for these large cracks in  
20 the batter was that in the regions of the cracks there was an  
21 abundance of chia seed and it was not holding together at  
22 all.) And, due to the use of the bright green spirulina  
23 powder in the cracker batter, the crackers turned a very  
24 unappealing green color.

25 The crackers were so unappealing due to the unsightly  
26 cracks, the clumps of chia therein, and the green color that  
27 Applicant only offered them for sale to two of his close  
28 friends, one of whom stated that he would even eat sand if he  
29 thought it was good for him, and the other who was legally  
30 blind. Due to the unappetizing appearance and unfavorable  
31 organoleptic properties (due to the clumps of chia therein)  
32 of these crackers, Applicant regretted his large recent  
33 purchase of chia seed, and included only small amounts of

1 chia seed in succeeding batches of crackers in order to avoid  
2 ruining them (while he used up the remaining chia seed).  
3 (Succeeding batches of crackers had at least a 4 to 1 ratio  
4 of gluten containing sprouts to chia seed. The CFA for  
5 succeeding batches of these early crackers ranged from 0.08  
6 to 0.20.) When his supply of chia seed was used up, Applicant  
7 planned to never again incorporate chia seed in any of his  
8 crackers. (It should be mentioned here that even if these  
9 crackers had not developed large unsightly cracks, Applicant  
10 nevertheless still would have believed that the crackers were  
11 being held together solely by the gluten in the milled wheat  
12 sprouts, and not by the as-yet-unknown agglutinating  
13 properties of whole slightly germinated chia seed.)

14 Another way of looking at Applicant's early experimental  
15 use of whole chia seed in crackers, is that each batch of  
16 crackers made at that time had a sufficient quantity of  
17 gluten-containing ingredients so that when these gluten-  
18 containing ingredients were ground up, the gluten contained  
19 therein was sufficient to bind together or agglutinate the  
20 crackers made therefrom. In other words, each of these early  
21 food products which contained whole chia seed had sufficient  
22 gluten-containing ingredients to agglutinate the products.

23 Thus, the background art does not show any food products  
24 containing whole (not ground or milled) chia seed which are  
25 firm to the touch, and are characterized by being  
26 substantially dry to the touch when touched, whereby the food  
27 product makes a convenient snack food which can be carried in  
28 one's pocket for example.

29 With the exception of Applicant's early experimental use of  
30 whole chia seed in crackers, none of the above methods for  
31 making chia seed-containing products produce a batter which

1 contains whole chia seed; on the contrary they all have  
2 either ground chia seed or chia seed meal in the batter to be  
3 dehydrated. And in none of the above methods (including  
4 Applicant's early experimental use of whole chia seed) is  
5 there a recognition that whole chia seed (or an agglutinant  
6 derived therefrom) in the absence of gluten-containing grains  
7 can be used to bind a product together such that it can be  
8 used as a convenient snack food. Further, chia seed has a  
9 mild but somewhat unusual taste which some people find objec-  
10 tionable. In none of the above methods (including Applicant's  
11 early experimental use of whole chia seed) is there disclosed  
12 a method which effectively masks the mild taste of the chia  
13 seed. This is important because it has been found that  
14 sweeteners alone will not mask the mild but slightly unusual  
15 taste of the chia seed. For a truly acceptable product, the  
16 taste of the chia seed should be masked so that it can not be  
17 detected. Further, none of the above methods teaches one how  
18 dehydrator screens could be used instead of dehydrator sheets  
19 which would greatly facilitate drying—the upper and lower  
20 sides of the batter could then dry simultaneously, thus  
21 greatly speeding up the drying process and reducing souring  
22 at the batter's lower surface.

23 Since the above background art methods do not teach one  
24 how to prepare a batter which could be spread on dehydrator  
25 screens, the commercial utility of these methods is severely  
26 limited by the bacterial souring which occurs, the unsightly  
27 cracks which develop in the batter, and the small yields of  
28 product obtained. Further, since in all of the above methods  
29 (with the exception of Applicant's experimental usage of  
30 whole chia seed), either chia seed meal is used or the whole  
31 chia seed is ground along with other ingredients in a food  
32 processor, significant exposure of the interior nutrients of  
33 these ingredients to oxidation will take place, resulting in

1 the destruction of some of these nutrients.

## 2 4.0 SUMMARY OF THE INVENTION, OBJECTS, AND ADVANTAGES

3 **NOTE:** Throughout the specification and the claims which  
4 follow, the words "seed" and "seeds" are interchangeably used  
5 for the plural of the word "seed".

### 6 4.1 SUMMARY OF INVENTION

7 The ideal agglutinant for making crackers (especially  
8 nonpasteurized crackers) would be one which

- 9 a. does not need to be ground to be easily chewed, grinding  
10 not only involving extra time and expense but also  
11 exposing the interior nutrients to the deleterious  
12 effects of oxidation;
- 13 b. does not need to be cooked to be easily chewed. Cooking  
14 not only involves extra time and expense but also damages  
15 or destroys many of the precious heat labile ingredients  
16 of the agglutinant;
- 17 c. would not be subject to the souring action of lactic acid  
18 bacteria;
- 19 d. does not contain gluten to which many people are  
20 sensitive, yet contributes to holding the cracker  
21 together so as to make it a convenient snack food;
- 22 e. makes possible the production of large quantities of  
23 crackers, by permitting a greatly increased yield from  
24 each dehydrator tray.
- 25 f. can be stirred into a thin easy-to-stir slurry of the  
26 other ingredients, and will then quickly thicken the  
27 resultant batter to such an extent that this batter can  
28 now be spread very thickly upon dehydrator screens  
29 (instead of on solid sheets) without significant leakage

through the dehydrator screens. Hence the other ingredients can first be thoroughly mixed together with sufficient water that this mixing operation consumes a minimum of energy. Cracker's made by the methods of this invention rely heavily on this most unusual property of chia seed—after all other ingredients have been thoroughly stirred together in a fairly thin easy-to-stir slurry, whole chia seed is added to quickly thicken the batter to such an extent that it can now be spread on dehydrator screens rather than on dehydrator solid sheets, thus resulting in large quantities of a nutritious product with large energy savings. (Suitable screen material would have a hole size of about 0.12 inches by 0.14 inches, and a strand thickness of about 0.05 inches. The screen material provides a perforated surface which gives drying air access to the lower drying surface of the cracker batter.) The type of drying surface provided by a supported screen, mesh, perforated surface or other functionally equivalent surface which gives drying air access to both the upper and lower surfaces of the drying batter simultaneously shall be called a "double-access drying surface". The upper surface of the double-access drying surface which contacts the lower surface of the drying batter shall be referred to as "the upper surface of the double-access drying surface".

- g. is at least slightly germinated. By slightly germinated, it is meant that the seed, after imbibing some of the liquid in which it is placed, is dehydrated slowly at a low temperature, thus giving the seed enough time to germinate to a small extent. This leads to a slight increase in enzymatic activity within the seed and a slight decrease in enzyme inhibitors.
- h. is characterized by having a taste which can easily be

1 masked by the addition of a suitable additive.  
2 i. is characterized by its use resulting in a food product  
3 which is firm to the touch, and substantially dry and  
4 non-gooey when so touched, so that the resultant food  
5 product makes a convenient snack food. If the food  
6 product is touched with one's finger, it will not cling  
7 to one's finger, and if it is picked up between two  
8 fingers, it will not fracture.

9 As it turns out, the proper proportion of whole chia seed  
10 in the batter with respect to the other ingredients and with  
11 respect to the water in the batter solves all of the problems  
12 with the background art products and has all the properties  
13 of the ideal agglutinant mentioned above.

14 Furthermore, an agglutinant which Applicant extracted from  
15 chia seed, although it does not have all the properties  
16 above, does have properties a through d and h. Thus an  
17 agglutinant derived from chia seeds is ideal for making raw  
18 sprouted grain crackers when it is not desired to have chia  
19 seed as one of the ingredients.

20 To overcome the disadvantages found in the background art  
21 methods, Applicant presents as his invention a new class of  
22 food products which is prepared with the nonsouring  
23 gluten-free agglutinant, slightly germinated whole chia seed  
24 or an agglutinant derived therefrom. When using chia seeds  
25 instead of the agglutinant derived therefrom, the chia seeds  
26 should preferably be nonpasteurized in order to spare the  
27 many heat sensitive nutrients of the chia seeds. With the  
28 advent of this invention, not only can food products be  
29 prepared with a CFA in excess of 0.50, but with CFA's which  
30 range as high as 1.00. Specifically, Applicant claims as his  
31 invention a new class of food products with CFA's in excess



1 of 0.6. Hence each product having whole chia seed as one of  
2 its ingredients in this new class of food products is  
3 prepared with an amount of chia seed which is in excess of  
4  $(0.6/0.4)*GCI$  and thus, at least  $1.5*MAA$ . Each of the food  
5 products disclosed in this application which have whole chia  
6 seed as one of the ingredients has a CFA in excess of 0.6.  
7 None of the background art products, nor even any product  
8 resulting from Applicant's early use of chia seed, had a CFA  
9 higher than 0.5.

10 The preferred embodiments of this new class of food  
11 products are low in gluten-containing ingredients. The bulk  
12 of the agglutinative burden is borne by the whole chia seeds,  
13 or an agglutinant derived therefrom, in these products and  
14 only a small part of the burden is borne by any gluten-  
15 containing ingredients therein. In other words the preferred  
16 embodiments of this new class of food products are absent  
17 sufficient gluten-containing ingredients to agglutinate the  
18 products. Another way of saying this is that the preferred  
19 embodiments of this new class of food products have  
20 insufficient gluten-containing ingredients to agglutinate the  
21 products. Needless to say, the most preferred embodiments  
22 are entirely gluten-free, the whole burden of agglutinating  
23 the food products being borne by the whole chia seed or the  
24 derived chia seed agglutinant contained therein.

25 One of the major products in this invention is a cracker  
26 that has the organoleptic properties of figs. This cracker  
27 consists of chia seed, a sweet syrup, and carob powder.  
28 Throughout the remainder of this specification, the term  
29 sweet syrup shall be used for the group of syrups consisting  
30 of honey, fruit syrups, grain syrups, tree syrups, and  
31 molasses. When crackers are prepared with chia seed and the  
32 syrup alone, the mild but somewhat unusual taste of the chia

1 seed can be detected. But with the use of a suitable amount  
2 of carob powder, the taste of the chia seed is completely  
3 masked, and the product tastes like and has the organoleptic  
4 properties of dried figs: sweet, chewy, and slightly crunchy.  
5 Due to their strong and pleasant taste, the following may be  
6 used in addition to or in place of carob powder in these  
7 products to mask the taste of the chia seed therein:  
8 chocolate, cocoa, roasted chicory, and coffee. In none of  
9 the products of the background art (including Applicant's  
10 early experimental use of whole chia seed) is there a  
11 recognition that when carob powder is included in the product  
12 in a suitable amount, the carob powder effectively masks the  
13 mild taste of the chia seed. This is important because syrups  
14 alone do not mask the mild but slightly unusual taste of the  
15 chia seed. But with the use of a sufficient amount of carob  
16 powder, the taste of the chia seed can not be detected.

17 The chia seeds in these products are preferably uncooked;  
18 i.e. they are not subjected to such times and temperatures  
19 which would denature the proteins thereof. Further, the chia  
20 seeds in these products are preferably nonpasteurized.  
21 According to the fourth edition of *Food Microbiology* by  
22 Frazier and Westhoff (McGraw-Hill Book Company, 1988),  
23 "Pasteurization is a heat treatment that kills part but not  
24 all of the microorganisms present and usually involves the  
25 application of temperatures below 100 C. . . . Times and  
26 temperatures used in the pasteurizing process depend on the  
27 method employed and the product treated. The high-  
28 temperature-short-time (HTST) method employs a comparatively  
29 high temperature for a short time, whereas the low-  
30 temperature-long-time, or holding (LTH), method uses a lower  
31 temperature for a longer time. Some examples follow of  
32 pasteurizing treatments given various types of foods. The  
33 minimal heat treatment of market milk is at 62.8 C for 30

1 minutes in the holding method; at 71.7 C for at least 15  
2 seconds in the HTST method; and at 137.8 C for at least 2  
3 seconds in the ultrapasteurized method. . . . Dried fruits  
4 usually are pasteurized in the package at 65.6 to 85 C for 30  
5 to 90 minutes, the treatment varying with the kind of fruit  
6 and the size of the package." (pages 24-25) All of these  
7 pasteurization methods destroy most of a food's enzyme  
8 activity. In fact, according to page 98 of the fourth edition  
9 of *Food Microbiology*, the bovine phosphatase enzyme is  
10 monitored in the pasteurization of milk. Detection of this  
11 enzyme in processed milk indicates that the milk was not  
12 properly pasteurized. When it is stated that the products of  
13 this invention are nonpasteurized, what is meant is that they  
14 were not subjected to such temperatures and durations of time  
15 which would be required to destroy most of the bacterial and  
16 fungal activity which ordinarily takes place in sprouts when  
17 their seed coats are broken. Such temperatures and times also  
18 destroy most of the enzyme activity as well. Further, these  
19 products are never heated to a temperature higher than 104° F  
20 (40° C), a temperature well below that required to destroy  
21 any of the known nutrients in seed sprouts.

22 Finally although slightly germinated whole chia seed, the  
23 agglutinant in these products, is raw, it is not soured. The  
24 drop in pH value of the chia seed in these food products  
25 during product preparation due to lactic acid bacterial  
26 souring is less than about 0.2. The sour taste which is found  
27 in raw sprouted gluten-containing grain products whose  
28 sprouted grains have been ground, is due to the excessive  
29 action of lactic acid bacteria on the moist exposed interior  
30 portion of the sprouted grain before dehydration was  
31 complete. As the lactic acid bacteria ferment the sugars of  
32 the sprouts in these products to lactic acid, the acid  
33 buildup in the product lowers the pH of the product thus

1 resulting in the sour taste. Such products typically  
2 experience a drop in pH from about 6.0 to less than 5.0  
3 during product preparation. Hence, for such products,  $\delta p H_{LA}$ ,  
4 the drop in pH due to lactic acid souring during product  
5 preparation, is greater than 1.0. (The LA in  $\delta p H_{LA}$  stands for  
6 Lactic Acid.)

7  $\delta p H_{LA}$ , the pH drop in any product due to lactic acid  
8 bacteria converting the sugars of the product to lactic acid  
9 during the preparation process can be determined as follows:

- 10 1. The cracker batter can be considered as consisting of a  
11 certain percentage by weight water and 100 minus that  
12 percentage by weight, solids. Based upon the percentages  
13 of the various ingredients used, the amount of water  
14 which each ingredient contains, and the amount of any  
15 additional water added to the batter, calculate the  
16 weight percentage of the batter that is water and the  
17 weight percentage that is solids. Applicant has deter-  
18 mined the weight percentage of water in the following  
19 ingredients:

| 20 | <u>Batter Ingredient</u>           | <u>Weight Percentage Water</u> |
|----|------------------------------------|--------------------------------|
| 21 | 18 hour sprouted wheat             | 47.0                           |
| 22 | Sage Honey                         | 12.0                           |
| 23 | Wild Desert Honey                  | 12.0                           |
| 24 | Maple Syrup                        | 31.5                           |
| 25 | Barley Malt                        | 16.5                           |
| 26 | Rice Syrup                         | 15.0                           |
| 27 | Molasses                           | 19.5                           |
| 28 | Bernard Jensen's Grape Concentrate | 36.0                           |
| 29 | Dehydrated Wheat Sprouts           | < 3                            |

|   | <u>Batter Ingredient</u> | <u>Weight Percentage Water</u> |
|---|--------------------------|--------------------------------|
| 2 | Sesame Seeds             | < 3                            |
| 3 | Chia Seed                | < 3                            |

4 Thus, for example, with respect to the 18 hour sprouted  
5 wheat, one ounce of wheat sprouts can be considered as  
6 consisting of 0.47 ounces of water and 0.53 ounces of  
7 wheat sprout solids.

8 2. Using the above percentages, take 1 ounce of the batter  
9 from which the product is to be made, and add sufficient  
10 distilled water to make a slurry which is six parts water  
11 and one part solids (hereinafter called a 6:1 slurry).  
12 For example, if it is determined that the one ounce of  
13 batter is "w" percent water, and therefore "100 - w"  
14 percent solids, it is necessary to add  $[6(100 - w) -$   
15  $w]/100 = (6 - .07w)$  ounces of distilled water to the one  
16 ounce of batter to form a 6:1 slurry.

17 3. Measure the pH of this slurry. Call it  $pH_o$ .

18 4. Dehydrate the batter to a water activity of 0.40.

19 5. Mill 1 ounce of the final product to flour, and stir it  
20 into 6 ounces of distilled water to form a 6:1 slurry.

21 6. Measure the pH of this 6:1 slurry. Call it  $pH_f$ .

22 7. Then  $\delta pH_{LA} = pH_o - pH_f$ , and is, therefore, a positive  
23 number which reflects the pH drop due to lactic acid  
24 formation in the product.

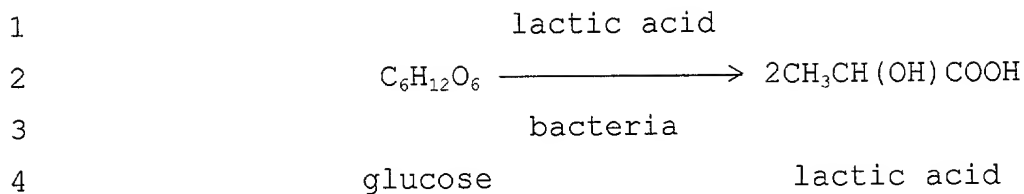
25 As used throughout this specification, the term "6:1  
26 slurry" refers to a slurry consisting of six parts distilled

1 water and 1 part the solids of the batter or the product made  
2 from the batter. In the case of a 6:1 slurry made from a  
3 batter, the water inherent in the batter plus added water  
4 would be six times the weight of the solids in the batter. In  
5 the case of a product made by dehydrating the batter, the  
6 product is considered as having no inherent water, and the  
7 water which is added is six times the weight of the portion  
8 of the product from which the slurry is to be made.

9 In the remainder of this specification, the pH value of a  
10 product containing chia seed shall be defined as the pH value  
11 of a 6:1 slurry prepared from that product. Similarly the pH  
12 value of a batter from which the product is to be made shall  
13 be defined as the pH value of a slurry consisting of six  
14 parts water and 1 part the solids of that batter (i.e.,  
15 enough water is to be added to the batter so that the water  
16 inherent in the batter plus added water would be six times  
17 the weight of the solids in the batter).

18 In each of the Examples of §5.7, the value of  $pH_f$  is an  
19 actual measured value. Unless indicated otherwise, the value  
20 of  $pH_o$  is an estimated value based on Applicant's previous  
21 work with these materials. Such estimated values will be  
22 reasonably close to actual measured values inasmuch as the pH  
23 of unsoured seeds and unsoured sprouted grains ranges from  
24 about 6.0 to about 6.5, depending on the type of seed or  
25 grain.

26 According to page 388 of the 4th edition of *Food*  
27 *Microbiology* (McGraw Hill Book Company, 1988), "A simplified  
28 equation for the production of lactic acid from glucose by  
29 such organisms (as lactic acid bacteria) is:



5       Actually a series of steps is involved, and small amounts  
6       of other products are produced."

7       According to the article on "Human Sensory Reception" on  
8       page 552 of Volume 16 of *The New Encyclopaedia Britannica*  
9       (Encyclopaedia Britannica, Inc., 15th Edition, 1982), "No  
10       simple relation has been found between chemical composition  
11       of stimuli and the quality of gustatory experience except in  
12       the case of acids. . . . The hydrogen ions of acids (e.g.,  
13       hydrochloric acid, HCl) are largely responsible for the sour  
14       taste; but although a stimulus grows more sour as its  
15       hydrogen ion (H<sup>+</sup>) concentration increases, this factor alone  
16       does not determine sourness. Weak organic acids (e.g., the  
17       acetic acid in vinegar) taste more sour than would be  
18       predicted from their hydrogen ion concentration alone;  
19       apparently the rest of the acid molecule affects the  
20       efficiency with which the hydrogen ions stimulate." This  
21       explains why raw sprouted grain crackers in which sufficient  
22       lactic acid souring has occurred to lower the pH of the  
23       crackers to 4.6 taste much more sour than honey which has a  
24       pH of about 4.0 and grape concentrate with a pH of 2.4. The  
25       lactic acid molecule stimulates those taste receptors in our  
26       taste buds which are sensitive to sour and bitter much more  
27       vigorously than do the acidic molecules in honey and grape  
28       concentrate.

29       Therefore, by measuring pH at various stages of the  
30       production process, it can be demonstrated that bacterial  
31       souring has not occurred in the slightly germinated whole

1 chia seed. As will be shown, those varieties of chia seed  
2 crackers prepared without ground grains experience a pH drop  
3 of less than about 0.2 during the course of processing.

4 In order to better illustrate the product and the methods  
5 that Applicant claims as his invention, Applicant will show  
6 below a side by side comparison of Applicant's method and  
7 Baker's method for producing Rice Crackers, the closest known  
8 background art.

9 First, Applicant weighed and recorded the weights of each  
10 of the ingredients listed in Baker's above recipe for Rice  
11 Crackers, so that this recipe could be exactly duplicated at  
12 any time. Applicant did not use the optional 1 teaspoon of  
13 salt. (Highly health conscious people favor a salt-free  
14 diet.) The above recipe then becomes:

| 15 | <u>Ingredients</u>        | <u>Method</u>                        |
|----|---------------------------|--------------------------------------|
| 16 | 2 cups rice (weighs 14    | Put the sprouted rice, the chia, and |
| 17 | ounces)                   | ½ cup of water into the bowl of a    |
| 18 |                           | food processor. Grind fine, and work |
| 19 | ½ cup chia (weighs 3.2    | into a dough. Then add soak water or |
| 20 | ounces)                   | plain water to make a very thick     |
| 21 |                           | cream. (This can be made in a blend- |
| 22 | ½ cup water (weighs 4.0   | er.) Cover a large cookie sheet with |
| 23 | ounces)                   | wax paper, or cellophane, and spread |
| 24 |                           | dough over all. Dehydrate at 100° F  |
| 25 | Soak water or plain water | in a dehydrator or in a preheated,   |
| 26 | (Applicant used 8 oz. of  | turned-off oven. Mark in squares     |
| 27 | distilled water)          | when half dry. When crisp, break     |
| 28 |                           | into squares and store in a sealed   |
| 29 | Sprout rice for 24 hours  | container in a cool, dry place.      |

30



1       When Applicant followed the above recipe, his food  
2 processor had difficulty grinding the mixture of rice  
3 sprouts, chia seed, and water due to the lack of sufficient  
4 water in the mix, the ground chia seed very quickly absorbing  
5 the available water. The resultant batter developed large  
6 cracks during dehydration and consequently had an  
7 unacceptable appearance. Therefore, Applicant modified the  
8 above recipe to utilize 8 ounces instead of 4 ounces of water  
9 in the mixture of rice sprouts, chia seed and water.  
10 Applicant's food processor was able to grind this modified  
11 mixture much better and much more thoroughly than the mixture  
12 resulting from the unmodified recipe. Applicant then reground  
13 the resultant batter with 4 additional ounces of water to  
14 make a very thick cream. Applicant estimates that  $pH_o$ , the pH  
15 value of a 6:1 slurry made from this batter would be about  
16 6.0. When the resultant batter was dehydrated, it still  
17 developed large cracks, but had a more acceptable appearance  
18 than previously.  $pH_f$ , the pH value of a 6:1 slurry made from  
19 the dehydrated product was 4.66. Hence  $\delta pH_{LA}$ , the pH drop due  
20 to lactic acid souring is estimated to be  $6.0 - 4.66 = 1.34$ .  
21 Applicant believes the cracks developed due to the fact that  
22 rice does not contain gluten, and the amount of chia seed  
23 used (3.2 oz.) is insufficient to bind together the 14 ounces  
24 of ground rice sprouts. Another contributing factor to the  
25 size of the cracks is that the batter, due to its low  
26 viscosity, must be dehydrated on dehydrator sheets which  
27 leads to rapid drying at the surface and slower drying where  
28 the batter contacts the dehydrator sheet, causing severe  
29 strains in the drying batter.

30       With these modifications and a filling in of details, on  
31 the next page is shown a side by side comparison of Baker's  
32 and Applicant's methods for making rice crackers:

|    |                                |                              |
|----|--------------------------------|------------------------------|
| 1  | Rice Crackers (Baker's Method) | Rice Crackers (Applicant's   |
| 2  |                                | Method)                      |
| 3  |                                |                              |
| 4  | 1A. Sprout 2 cups (= 14 oz.)   | 1B. Sprout 14 oz. of organic |
| 5  | of organic brown rice for      | brown rice for 24 hours.     |
| 6  | 24 hours.                      |                              |
| 7  |                                |                              |
| 8  | 2A. Measure out ½ cup (= 3.2   | 2B. Dehydrate the sprouted   |
| 9  | oz.) of chia seed.             | rice at a temperature of     |
| 10 |                                | 100 F (38 C) until dry. The  |
| 11 | 3A. Mix well the rice sprouts, | resultant dried rice         |
| 12 | the chia seed, and 1 cup       | sprouts should weigh about   |
| 13 | (= 8 oz.) of distilled         | 12.5 oz.                     |
| 14 | water.                         |                              |
| 15 |                                |                              |
| 16 | 4A. Grind fine the mixture of  | 3B. Mill the dried rice      |
| 17 | step 3A (approximately 10      | sprouts to flour.            |
| 18 | minutes).                      |                              |
| 19 |                                | 4B. Measure out an amount of |
| 20 |                                | chia seed which weighs the   |
| 21 |                                | same as the dried rice       |
| 22 |                                | sprout flour of step 3B.     |
| 23 | 5A. Add 4 oz. of distilled     |                              |
| 24 | water to the mixture of        | 5B. Pour an amount of 104° F |
| 25 | step 4A, and blend well        | (40° C) water which weighs   |
| 26 | (approximately 10              | 3.6 times the weight of      |
| 27 | minutes). (Working the         | the dried rice sprout        |
| 28 | batter into a dough does       | flour of step 3B (approx-    |
| 29 | not accomplish anything        | imately 45 oz.) into the     |
| 30 | inasmuch as neither rice       | pail to be used for mixing   |
| 31 | nor chia seed contains         | the batter.                  |
| 32 | gluten.)                       |                              |
| 33 |                                |                              |
| 34 |                                |                              |

|    |                                    |                                    |
|----|------------------------------------|------------------------------------|
| 1  | Rice Crackers (Baker's Method)     | Rice Crackers (Applicant's         |
| 2  |                                    | Method)                            |
| 3  |                                    |                                    |
| 4  |                                    | 6B. Pour milled rice sprouts       |
| 5  |                                    | into pail and stir well.           |
| 6  |                                    |                                    |
| 7  |                                    | 7B. While stirring vigorously,     |
| 8  |                                    | slowly pour chia seed into         |
| 9  |                                    | pail, and continue to stir         |
| 10 |                                    | vigorously for 5 minutes.          |
| 11 |                                    |                                    |
| 12 | 6A. Remove 2 oz. of batter.        | 8B. Remove 2 oz. of batter.        |
| 13 | Determine pH <sub>o</sub> , the pH | Determine pH <sub>o</sub> , the pH |
| 14 | value of a 6:1 slurry of           | value of a 6:1 slurry of           |
| 15 | this batter.                       | this batter.                       |
| 16 |                                    |                                    |
| 17 |                                    | 9B. Let batter in pail set for     |
| 18 |                                    | about 2 minutes before             |
| 19 |                                    | proceeding.                        |
| 20 |                                    |                                    |
| 21 | 7A. Put a dehydrator circular      | 10B. Place a dehydrator circu-     |
| 22 | solid sheet in a dehydra-          | lar screen on a smooth             |
| 23 | tor tray.                          | clean hard surface.                |
| 24 |                                    |                                    |
| 25 | 8A. Pour all the batter of         | 11B. Spread evenly around on       |
| 26 | step 5A (weighing approxi-         | the dehydrator circular            |
| 27 | mately 2 lbs.) onto the            | screen all 4 lbs. 6 oz.            |
| 28 | dehydrator solid sheet,            | of batter from the pail.           |
| 29 | and spread batter evenly           |                                    |
| 30 | around on dehydrator               |                                    |
| 31 | circular solid sheet.              |                                    |
| 32 |                                    |                                    |
| 33 |                                    |                                    |
| 34 |                                    |                                    |

|    |                                |                                 |
|----|--------------------------------|---------------------------------|
| 1  |                                | Rice Crackers (Applicant's      |
| 2  | Rice Crackers (Baker's Method) | Method)                         |
| 3  |                                |                                 |
| 4  |                                | 12B. Lift screen with the       |
| 5  |                                | batter on it, and place         |
| 6  |                                | it onto a dehydrator tray.      |
| 7  |                                | Place a circular screen on      |
| 8  |                                | top of the batter, and          |
| 9  |                                | invert and fit another          |
| 10 |                                | dehydrator tray on top of       |
| 11 |                                | the first dehydrator tray.      |
| 12 |                                |                                 |
| 13 |                                | 13B. Flip this two tray assem-  |
| 14 |                                | bly, and remove the top         |
| 15 |                                | dehydrator tray and circu-      |
| 16 |                                | lar screen.                     |
| 17 |                                |                                 |
| 18 |                                | 14B. Place lower dehydrator     |
| 19 | 9A. Place the dehydrator tray  | tray with its batter on         |
| 20 | containing the solid sheet     | the dehydrator base unit.       |
| 21 | with its batter on the         | Place an empty dehydrator       |
| 22 | dehydrator base unit.          | tray on top. Place the          |
| 23 | Place the insulated dehy-      | insulated dehydrator cover      |
| 24 | drator cover on top of the     | on top of the top tray.         |
| 25 | top tray, and set dehydra-     | Set dehydrator temperature      |
| 26 | tor temperature to 100 F       | to 100° F (37.8 C).             |
| 27 | (37.8 C).                      |                                 |
| 28 |                                | 15B. 30 minutes after step 14B, |
| 29 | 10A. 30 minutes after step 9A, | slice the drying batter         |
| 30 | slice the drying batter        | into 1/4 inch by 1 inch         |
| 31 | into 2 inch squares.           | rectangles.                     |
| 32 |                                |                                 |
| 33 |                                |                                 |
| 34 |                                |                                 |
| 35 |                                |                                 |

|    |                                       |                                       |
|----|---------------------------------------|---------------------------------------|
| 1  | Rice Crackers (Baker's Method)        | Rice Crackers (Applicant's            |
| 2  |                                       | Method)                               |
| 3  |                                       |                                       |
| 4  | 11A. Three hours later, reslice       | 16B. Every 30 minutes for the         |
| 5  | the drying batter into the            | next three hours, re-slice            |
| 6  | squares of step 10A.                  | the drying batter into the            |
| 7  |                                       | rectangles of step 15B.               |
| 8  |                                       |                                       |
| 9  | 12A. Continue to dehydrate the        | 17B. Continue to dehydrate the        |
| 10 | batter until its water                | batter until its water                |
| 11 | activity has been reduced             | activity has been reduced             |
| 12 | below 0.60, and preferably            | below 0.60, and preferably            |
| 13 | below 0.40, in order to               | below 0.40, in order to               |
| 14 | eliminate any possibility             | eliminate any possibility             |
| 15 | of microbial activity.                | of microbial activity.                |
| 16 |                                       |                                       |
| 17 |                                       |                                       |
| 18 | 13A. Determine the cross-             | 18B. Determine the cross-             |
| 19 | sectional area and tensile            | sectional area and tensile            |
| 20 | strength of a typical                 | strength of a typical                 |
| 21 | cracker.                              | cracker.                              |
| 22 |                                       |                                       |
| 23 | 14A. Mill the cracker and             | 19B. Mill the cracker and             |
| 24 | determine $pH_f$ , the pH             | determine $pH_f$ , the pH             |
| 25 | value of a 6:1 slurry                 | value of a 6:1 slurry                 |
| 26 | prepared from the cracker.            | prepared from the cracker.            |
| 27 | Then $\delta pH_{LA} = pH_o - pH_f$ . | Then $\delta pH_{LA} = pH_o - pH_f$ . |
| 28 |                                       |                                       |
| 29 |                                       |                                       |
| 30 |                                       |                                       |
| 31 |                                       |                                       |
| 32 |                                       |                                       |
| 33 |                                       |                                       |
| 34 |                                       |                                       |
| 35 |                                       |                                       |

1       Applicant will now describe the novel features of his  
2       invention referring to the several steps of his above method  
3       for making sprouted rice crackers.

4       The big advantage in drying the rice sprouts at step 2B is  
5       that the dried sprouts may be stored and milled as needed.  
6       But when the wet sprouts are ground to a paste (as in Baker's  
7       method), the crackers must be made immediately, as ground wet  
8       sprouts will start to sour noticeably after only a few hours.

9       The advantage in milling the dried sprouts to a flour as  
10      opposed to grinding the wet sprouts to a paste is that  
11      sprouts can be ground much more quickly and much more finely  
12      in a mill than in a food processor.

13      At step 4B, an amount of chia seed equivalent to the  
14      weight of the dried rice is measured out. It takes about a 1  
15      to 1 ratio of whole chia seed to nongluten-containing  
16      ingredients to yield a cracker which holds together well. At  
17      step 5B, just the right proportion of water must be used. If  
18      too little water relative to chia seed is used, the rice and  
19      chia seed mixture will become too thick to be evenly spread  
20      on the dehydrator screen at step 11B. If too much water  
21      relative to chia seed is used, the chia seed and rice mixture  
22      will be too watery to be spread upon a screen at all and will  
23      ooze through the openings in the screen.

24      Rice crackers were made by Applicant's method. At step 8B,  
25      it is estimated that  $pH_o$ , the pH of a 6:1 slurry made from the  
26      batter would be about 6.0. And  $pH_f$ , the pH value of a 6:1  
27      slurry made from the dehydrated product  $pH_f$  was 5.0. Hence it  
28      is estimated that  $\delta pH_{LA}$ , the pH drop due to lactic acid  
29      souring would be about  $6.0 - 5.0 = 1.0$ .

30      Whole chia seed has a number of advantages over ground

1 chia seed:

- 2 1. Since the chia seed is not ground, not only will its  
3 interior nutrients be protected from oxidation, but  
4 bacteria will not have access to the seed's interior,  
5 effectively preventing any souring thereof.
- 6 2. The fewer the ingredients that are ground, the greater the  
7 energy savings will be, and the more quickly the resultant  
8 product can be prepared.
- 9 3. Not having its seed coat broken, whole chia seed resists  
10 rancidity much better than ground chia seed.

11 Crackers made from whole chia seed have a number of advan-  
12 tages over those background art crackers made from a large  
13 proportion of gluten containing grains:

- 14 1. Chia seed does not contain gluten to which many people are  
15 allergic.
- 16 2. Chia seed stirs easily into an aqueous slurry of the other  
17 ingredients, and, after having been thoroughly mixed  
18 together with them, quickly thickens the batter to such an  
19 extent that the batter can now be spread upon dehydrator  
20 screens, where the upper and lower surfaces of the batter  
21 dry simultaneously. This shortens drying time, limits  
22 bacterial souring, and, reduces energy costs. Further, the  
23 resultant product has no cracks and has a more uniform  
24 color and appearance; the upper and lower surfaces of the  
25 product are indistinguishable. (Suitable screen material  
26 would have a hole size of about 0.12 inches by 0.14  
27 inches, and a strand thickness of about 0.05 inches. The  
28 screen material provides a perforated surface which gives  
29 drying air access to the lower surface of the drying  
30 cracker batter.) The type of drying surface provided by a  
31 supported screen, mesh, perforated surface or other  
32 functionally equivalent surface which gives drying air

1 access to both the upper and lower surfaces of the drying  
2 batter simultaneously shall be called a "double-access  
3 drying surface". The upper surface of the double-access  
4 drying surface which contacts the lower surface of the  
5 drying batter shall be referred to as "the upper surface  
6 of the double-access drying surface".

7 3. Since the upper and lower surfaces are equally exposed to  
8 drying air, any souring of the other ingredients will be  
9 moderate, and the pH values of slurries prepared from the  
10 upper and lower surfaces of the dried end-product will be  
11 nearly equal.

12 4. Since batter containing sufficient chia seed holds  
13 together well even before being dehydrated, large  
14 quantities of batter can be spread upon each dehydrator  
15 screen without overflowing, thus dramatically increasing  
16 the yield from each dehydrator tray, and, again, reducing  
17 costs.

18 Step 7B is a very critical step. Since the chia seed very  
19 quickly absorbs water, Applicant originally thought that the  
20 chia seed had to be poured into the pail all at once and  
21 quickly stirred. In fact, the directions found on boxes of  
22 bulk-forming laxatives containing psyllium husks (which act  
23 similarly to chia seed in absorbing water, but neither as  
24 much as nor as quickly as chia seed) specify that the product  
25 must be quickly poured into a glass of water and drunk  
26 quickly before it has a chance to gel and thicken. But when  
27 chia seed is quickly poured all at once into the mixing pail,  
28 it tends to conglomerate and solidify into many large clumps  
29 which frustrates any attempt to evenly disperse the chia seed  
30 throughout the rest of the batter. This greatly hinders  
31 attempts to smoothly spread the batter on the drying surface,  
32 and furthermore results in clumps of chia seed in the final  
33 product, which renders the product unmarketable. After much  
34 trial and error, Applicant determined that the best way to



1 add the chia seed is to very slowly pour in the chia seed  
2 while quickly stirring the mixture into which the chia seed  
3 is being poured (no more than about 1/300 of an ounce of chia  
4 seed per revolution of the mixing paddle per square inch of  
5 the surface area of the mixture in the mixing container).

6 The reason for the wait of step 9B is to give the chia  
7 seed a chance to absorb water from the rest of the batter  
8 thus stiffening or thickening it. With as little water as is  
9 being used here, the mixture very quickly becomes thick  
10 enough to be spread on dehydrator screens rather than upon  
11 solid sheets. The big advantage of using screens rather than  
12 solid sheets is that the batter after being spread on the  
13 screens dries on both the upper and lower surfaces  
14 simultaneously, thus doubling the rate at which a given  
15 thickness of batter dries, greatly reducing the bacterial  
16 souring in any milled ingredients which were added to the  
17 batter, and greatly facilitating much larger yields per  
18 dehydrator tray. Further, the screen peels off of the final  
19 product much easier than a solid dehydrator sheet would. If  
20 just the right proportions of chia seed, other ingredients  
21 (rice sprouts, here), and water are used, the dehydrator  
22 screen will peel off the final dried product with practically  
23 no sticking whatsoever.

24 The reason for placing the dehydrator circular screen on a  
25 smooth surface before spreading the batter on it is that the  
26 batter is somewhat stiff and consequently a considerable  
27 amount of pressure must be applied to spread and smooth the  
28 batter evenly over the dehydrator screen. Without a solid  
29 surface underneath the circular screen, the batter tends to  
30 be forced through the screen openings. Even with a solid  
31 surface underneath, the batter somewhat tends to fill in the  
32 screen openings. Therefore, at steps 12B and 13B, the screen  
33 with its batter is placed in a dehydrator tray, another

1 screen is placed on top of the batter, an inverted dehydrator  
2 tray is placed on top of the first dehydrator tray. Each  
3 dehydrator tray has a circular wall surrounding the center  
4 hole with openings in the wall for air circulation. When one  
5 dehydrator tray is inverted and fitted on the other  
6 dehydrator tray, these walls interlock forming a tightly  
7 fitting two tray assembly. This whole two tray assembly is  
8 then flipped, the top tray (which was the bottom tray) is  
9 removed, and the screen is peeled off. Since the chia seed is  
10 very cohesive at this point, the screen peels off very  
11 easily. Wet chia seed sticks to itself much more strongly  
12 than it sticks to the screen and thus, as the screen is  
13 pulled away from the batter, the chia seed at or near the  
14 surface of the batter pulls away from the screen openings any  
15 batter which was partially forced through them when the  
16 batter was being spread on the screen. Now the batter is  
17 sitting on the screen which was placed on top of it in step  
18 12B. Since the batter was never pressed onto this screen by  
19 any vigorous spreading action, once the batter is dry, it  
20 peels away from the screen very easily. In those products in  
21 which a sticky syrup like honey is not used, the screen  
22 literally falls away from the dried batter, thus not only  
23 greatly speeding up production, but also greatly simplifying  
24 cleanup.

25 It should be noted that products prepared according to the  
26 above methods will not develop the ugly disfiguring cracks  
27 common to products containing chia seed prepared without  
28 these methods. The first time Applicant prepared a batter  
29 containing whole chia seed, he spread the batter on  
30 dehydrator solid sheets rather than upon circular screens. As  
31 the batter dried, it developed ugly disfiguring cracks. And  
32 it was not obvious what, if anything, could be done to  
33 prepare a product without these ugly cracks which rendered  
34 the product unmarketable. The following factors have been

1 found to wholly eliminate the unsightly cracks in the drying  
2 batter:

- 3 1. The chia seed to be added to the batter is added as  
4 follows: The chia seed is very slowly poured into the  
5 mixing container while quickly stirring the mixture into  
6 which the chia seed is being poured (no more than about  
7 1/300 of an ounce of chia seed per revolution of the  
8 mixing paddle per square inch of the surface area of the  
9 mixture in the mixing container). This results in the chia  
10 seed being evenly dispersed throughout the batter thus  
11 preventing the forming of numerous clumps of chia seed in  
12 the batter.
- 13 2. Using sufficient whole chia seed in the batter to be  
14 dried, especially if the batter does not contain any  
15 gluten-bearing ingredients. If too little chia seed is  
16 used, the batter will not hold together well, and this  
17 contributes to cracks developing in the batter.
- 18 3. Repeatedly slicing the batter during the first few hours  
19 of drying. Repeatedly slicing the batter during the early  
20 hours of drying alleviates the pressures which develop in  
21 the batter crust as it dries.
- 22 4. Drying the batter on screens rather than on solid sheets.  
23 When solid sheets are used, the batter near the surface  
24 dries more quickly than the portion of the batter in  
25 contact with the solid sheet resulting in strains  
26 developing in the batter. These strains aggravate any  
27 tendency to cracking.
- 28 5. As batter dries, a crust tends to develop on the surfaces  
29 of the batter through which it is increasingly more  
30 difficult for moisture to escape as time passes. (This is  
31 known as "case-hardening".) Slicing the batter into thin  
32 slices (1/4 inch or less) early and often in the  
33 dehydration process not only alleviates much of the strain  
34 which develops in the batter as it dries and shrinks, but

1       also gives moisture many places to escape through the  
2       drying crust. This greatly reduces drying time and  
3       inhibits microbial activity.

4       Applicant has recently discovered that the agglutinant in  
5       chia seed can easily be separated from the chia seed and be  
6       used to agglutinate products which do not have chia seed as  
7       an ingredient. This agglutinant has a most unusual  
8       property—it has an effect out of all proportion to its  
9       weight; Very little need be used to agglutinate a product.  
10      One of the drawbacks of products containing whole chia seed  
11      is that the chia seed tends to stick somewhat between one's  
12      teeth thus resulting in a somewhat unsightly appearance. By  
13      using only the agglutinant extracted from chia seed rather  
14      than the whole chia seed, this negative consequence is  
15      avoided.

16      What is meant when it is said that the mucilaginous  
17      properties of whole chia seed cause products in which it is  
18      used to cohere is that when an aqueous mixture of the other  
19      ingredients is formed, and whole chia is stirred in, the  
20      mucilaginous seed coats of the chia seed dissolve and come  
21      into intimate contact with the other ingredients to such an  
22      extent that when the product is dried, the product coheres.

23      What is meant when it is said that the mucilaginous  
24      properties of the agglutinant derived from whole chia seed  
25      cause products in which it is used to cohere is that when an  
26      aqueous mixture of the other ingredients is formed and the  
27      agglutinant derived from whole chia is stirred in, this  
28      agglutinant dissolves and comes into intimate contact with  
29      the other ingredients to such an extent that when the product  
30      is dried, the product coheres.

31      The purpose of this invention is to produce a good tasting

1 attractive appearing snack food from slightly germinated  
2 whole chia seed which:

- 3 1. is easy to chew—not only is the seed coat of whole chia  
4 seed relatively soft but it quickly dissolves in the  
5 mouth leading to a very easy to chew product.
- 6 2. does not have the sharp edges sometimes exhibited by  
7 products prepared exclusively with gluten containing  
8 grains.
- 9 3. holds together well. It is characterized by its use  
10 resulting in a food product which is firm to the touch,  
11 and substantially dry and non-gooey to the touch when so  
12 touched, so that the resultant food product makes a  
13 convenient snack food.
- 14 4. has good shelf-life and resists rancidity.
- 15 5. is low in gluten or is gluten-free. Certain people are  
16 allergic to wheat or cannot properly digest it leading to  
17 digestive distress. Their diet must be completely  
18 gluten-free.
- 19 6. has very few processing steps: the chia seed need not be  
20 previously sprouted and needs only to be stirred into a  
21 batter of the other ingredients. (When the chia seed is  
22 stirred into the batter, it absorbs water, and, during  
23 further processing, sprouts to a slight extent; hence, it  
24 is referred to as slightly germinated.) Further, the chia  
25 seed does not need to be milled into flour before being  
26 used to make crackers.
- 27 7. provides complete protection of the interior nutrients of  
28 the chia seed against the ravages of oxidation which  
29 would destroy some of those interior nutrients if the  
30 chia seed were ground into flour.
- 31 8. is unsoured. Since the chia seed is not ground into a  
32 paste or a flour which would expose the inner portion of  
33 the seed to lactic acid bacteria, it does not sour during  
34 the dehydration process which produces the final product.

- 1 Further, since chia seed quickly absorbs all available
- 2 water during the preparation process, this water is kept
- 3 from those ingredients which have a tendency to sour,
- 4 thus greatly retarding the souring of those ingredients.
- 5 9. is partially or slightly germinated. Slightly germinating
- 6 chia seed will decrease its content of enzyme inhibitors
- 7 and slightly increase enzymatic activity. And since it is
- 8 slightly germinated, it also has increased vitamins over
- 9 the unsprouted chia seed, and is somewhat better digested
- 10 than unsprouted chia seed.
- 11 10. is of excellent and uniform appearance. This product is
- 12 not disfigured by the ugly cracks which ruin the
- 13 appearance of the background art products.
- 14 11. can be made relatively thick; hence, there are fewer
- 15 dehydrator screens to clean for a given weight of end
- 16 product.
- 17 12. the final product does not stick to the screens on which
- 18 it was dried; hence, no oil is required in product
- 19 preparation.
- 20 13. in one of its forms, has the organoleptic properties of
- 21 dried figs: chewy, crunchy, and sweet.

22 Another purpose of this invention is to produce a good  
23 tasting attractive appearing snack food from the agglutinant  
24 derived from slightly germinated whole chia seed which:

- 25 1. does not have the sharp edges sometimes exhibited by
- 26 products prepared exclusively with gluten containing
- 27 grains.
- 28 2. holds together well. The resultant food product will be
- 29 firm to the touch, and substantially dry and non-gooey to
- 30 the touch when so touched, so that the resultant food
- 31 product will make a convenient snack food. If the food
- 32 product is touched with one's finger, it will not cling
- 33 to one's finger, and if it is picked up between two

- 1 fingers, it will not fracture.
- 2 3. is expected to have good shelf-life and resist rancidity.
- 3 4. is low in gluten or is gluten-free. Certain people are
- 4 allergic to wheat or can not properly digest it leading
- 5 to digestive distress. Their diet must be completely
- 6 gluten-free.
- 7 5. has very few processing steps: the agglutinant derived
- 8 from the whole chia seed needs only to be stirred into a
- 9 batter of the other ingredients.
- 10 6. is unsoured. Since the agglutinant is derived from chia
- 11 seed which has not been ground, it does not sour during
- 12 the dehydration process which produces the final product.
- 13 7. is of excellent and uniform appearance. This product is
- 14 not disfigured by the ugly cracks which ruin the
- 15 appearance of the background art products.

#### 16 4.1 OBJECTS AND ADVANTAGES

17 Accordingly, several objects and advantages of the instant  
18 invention are:

- 19 (a) to provide a gluten-free agglutinant which can be stirred
- 20 into a batter of various other ingredients and
- 21 consequently thicken the batter to such an extent that
- 22 the batter can be piled higher on dehydrator screens than
- 23 it ever before could be piled on dehydrator solid sheets
- 24 with no more than a small amount of souring occurring in
- 25 any sourable ingredients. The rapid drying which occurs
- 26 when dehydrator screens are used greatly retards
- 27 bacterial souring of any ingredients which were ground
- 28 before being stirred into the batter.
- 29 (b) to provide easy to chew sprouted food products with
- 30 pleasant taste and excellent shelf life and thus suitable
- 31 for a dietary staple and a healthful snack food. The

- 1 shelf stability of these products is due to the water  
2 activity of the product having been reduced to less than  
3 0.80 for short term storage and to less than 0.60 for  
4 long term storage.
- 5 (c) to provide a quick drying method for making large  
6 quantities of good tasting sprouted products very  
7 economically and with significant energy savings. With  
8 each species, the batter not only can be made up to 1  
9 inch thick, but also can be spread on dehydrator screens  
10 instead of dehydrator solid sheets thus greatly speeding  
11 up the dehydration process and reducing bacterial  
12 souring. Not only can larger batches of crackers now be  
13 obtained, but also fewer dehydrator trays and screens  
14 need be used, and considerably less cleanup is required.
- 15 (d) to provide methods of preparing sprouted seed products in  
16 which mold and fungal growths are entirely prevented.
- 17 (e) to provide a healthful product with not only a pleasant  
18 satisfying taste but also an attractive appearance as  
19 well.
- 20 (f) to provide a gluten free agglutinant for agglutinating  
21 all kinds of foods from the vegetable kingdom: fruits,  
22 vegetables, grains (both sprouted and unsprouted), sweet  
23 syrups (including honey), vegetable powders, etc.
- 24 (g) to provide low-gluten food products with a CFA in excess  
25 of 0.6, and gluten-free foods with a CFA of 1.0.
- 26 (h) to provide a food product with the organoleptic  
27 properties of dried figs: sweet, chewy, and slightly  
28 crunchy.



1 (i) to provide an agglutinant derived from whole slightly  
2 germinated chia seed which can be used as a nonsweet  
3 gluten-free agglutinant for various food products.

4 For the purpose of illustration of this invention, a  
5 preferred embodiment is shown in the accompanying drawings.  
6 It is to be understood that this is for the purpose of  
7 example only and that the invention is not limited thereto.

#### 8 5.0 BRIEF DESCRIPTION OF THE DRAWINGS

9 Fig. 1 shows a perspective view of one of the preferred  
10 embodiments on a dehydrator screen before being sliced;

11 Fig. 2 shows a perspective view of one of the preferred  
12 embodiments on a dehydrator screen after having been sliced;

13 Fig. 3 shows an enlarged perspective view of one piece of one  
14 of the preferred embodiments;

15 Fig. 4 shows a perspective view of a dehydrator screen.

#### 16 6.0 DETAILED DESCRIPTION OF THE INVENTION

17 In this section of his patent application, Applicant will  
18 describe the ingredients he uses and their sources, the  
19 equipment he uses and its sources, the proper setup of this  
20 equipment, and the methods for producing each of the three  
21 species of his invention.

1      6.1 DESCRIPTION OF INGREDIENTS USED IN MANUFACTURE OF INVENTION

| 2  | <u>Ingredient</u>            | <u>Source/Manufacturer</u>    |
|----|------------------------------|-------------------------------|
| 3  | Certified Chemical-free Chia | Garden Spot Distributors      |
| 4  | Seed                         | New Holland, PA 17557         |
| 5  | Nickabood's Desert Gold      | Nickabood's Inc., 1401 Elwood |
| 6  | Unheated Unfiltered Honeys   | Street, Los Angeles, CA 90021 |
| 7  | Hulled Chemical-free Sesame  | Garden Spot Distributors, New |
| 8  | Seed                         | Holland, PA                   |
| 9  | Bernard Jensen's Apple and   | Bernard Jensen Products,      |
| 10 | Grape Concentrates           | Solana Beach, CA 92075        |
| 11 | Organic Brown Teff Grain     | Mountain Ark Trading Co.      |
| 12 |                              | Fayetteville, AR 72701        |
| 13 | Certified Chemical-free      | Garden Spot Distributors      |
| 14 | Carob Powder                 | New Holland, PA 17557         |

15      6.2 DESCRIPTION OF EQUIPMENT USED IN MANUFACTURE OF INVENTION

| 16 | <u>Equipment</u>               | <u>Source/Manufacturer</u>  |
|----|--------------------------------|-----------------------------|
| 17 | Harvest Maid™ Model FD 1000    | Alternative Pioneering Sys- |
| 18 | Food Dehydrator                | tems, Inc., Minneapolis, MN |
| 19 | Kitchen Mill™ Electric Flour   | K-Tec, American Fork, Utah. |
| 20 | Mill                           | Kitchen Mill is a trademark |
| 21 |                                | of K-Tec Corporation        |
| 22 | Presto® SaladShooter™ Electric | National Presto Industries, |
| 23 | Slicer and Shredder            | Inc., Eau Claire, WI 54703  |

1       The Harvest Maid™ Model FD 1000 Food Dehydrator is a four  
2       tray dehydration unit (with optional additional trays) which  
3       has a circular base unit containing a motorized fan and a  
4       core filament heating element. The trays of material to be  
5       dehydrated are stacked on the circular base unit, the  
6       insulated cover is placed on the top tray, the desired  
7       temperature is selected via a rotary dial, and the power is  
8       turned on. The construction of the circular interlocking  
9       trays allows warm air currents to flow in a circular pattern  
10      from the bottom tray to the top tray thus providing fast even  
11      drying. Due to the design and strength of the fan motor, the  
12      circular trays can be stacked thirty high. For dehydrating  
13      solids, a circular screen (the registered trademark name is  
14      "Clean-A-Screens") is placed in each tray before putting the  
15      solids in the trays. For dehydrating liquids, a solid  
16      circular sheet (Alternative Pioneering Systems trademark name  
17      for these items is "Fruit Roll-Up Sheets") is placed in each  
18      tray, and the liquid is poured on the sheets. Except for the  
19      fact that this particular model dehydrator seems to dry much  
20      faster than the other models which have been used, the type  
21      of dehydrator used is probably not critical to the success of  
22      the methods used to make Applicant's invention.

23      The Kitchen Mill™ Electric Flour Mill is used to mill the  
24      dehydrated sprouted wheat used in the method for making the  
25      Chia and Sprouted Wheat Crackers, and also the dehydrated  
26      sprouted wheat and millet used in the method for making Chia  
27      Scramblers both of which methods are described below. The  
28      milling chamber's concentric spinning metal sections which  
29      burst the seed into flour do not actually touch which results  
30      in a cooler milling operation than with most other flour  
31      mills. Furthermore, the ease with which an 8 inch stem  
32      thermometer may be mounted transversely in the flour mill's  
33      Lexan™ Flour Pan just below the point where the flour leaves  
34      the milling chamber, makes it easy to monitor the temperature

1 of the sprouts as they are being ground. When the temperature  
2 gets too high, one need only turn off the mill and  
3 refrigerate it until the temperature is once again safe for  
4 the vital nutrients in the sprouts. And since this mill does  
5 not use grinding stones, there is no possibility that stone  
6 grit will mix with the flour.

7 The Presto<sup>R</sup> SaladShooter<sup>TM</sup> Electric Slicer and Shredder is  
8 used to shred fruits and vegetables. Following the  
9 instructions in the instruction booklet, the food chamber  
10 assembly is assembled with the Shredder Cone and is mounted  
11 on the motorized base. The Shredder Cone has 24 sharp  
12 projections which shred fruits and vegetables into slices  
13 which are about 1 3/4 inches long, 1/8th of an inch wide, and  
14 1/16th of an inch thick.

## 15 6.3 SETUP OF EQUIPMENT USED IN MANUFACTURE OF INVENTION

### 16 6.3.1 Method of Manufacture of Despoked Trays and 17 Screen-Forms

18 The circular dehydrator trays of the Harvest Maid Model FD  
19 1000 Food Dehydrator are about 15 1/4 inches in diameter.  
20 Starting from the circular outer wall of a dehydrator tray  
21 and heading toward the circular hole at the center of a  
22 dehydrator tray, one successively comes upon the thicker  
23 outer wall just mentioned, a thinner circular inner wall,  
24 thin plastic spokes pointing toward the center of the tray,  
25 and a finned wall surrounding the hole in the very center of  
26 the dehydrator tray. The outer wall of the tray is about  
27 five-sixteenths of an inch thick in the horizontal direction,  
28 and about 1 inch high in the vertical direction. The  
29 thickness of the inner wall is about 1/16th of an inch in the  
30 horizontal direction. Leading from the inner wall of the tray  
31 to the 2 1/8 inch diameter finned central hole of the tray

are numerous thin plastic spokes which provide the support for the sheet or screen to be placed in the dehydrator tray. These trays are stacked one above the other on the dehydrator base unit. Due to the height of the outer wall of the tray and the thickness of the spokes leading to the central hole of the tray, batter can be put in each tray to a depth of no more than about three-fourths of an inch. Therefore, when it is desired to place batter which is thicker than three-fourths of an inch on a dehydrator screen, it is necessary to remove the entire spoked area of one or more of the trays by cutting the spokes at the point where the spokes meet the inside surface of the inner wall of the tray. Then after placing the batter on a dehydrator screen, this screen with its batter can be placed in one of the original trays which still retains its spoked area, and this tray placed on the dehydrator base unit. Then one or more trays with their spokes removed can be stacked on top of this tray (thus providing head room for the batter), and an empty dehydrator tray is placed on top (for additional ventilation).

(1) Using a knife or a saw, remove the entire spoked area from one of the dehydrator trays. This tray, hereinafter called the despoked tray, can be used in each of the methods for making chia seed-based products.

(2) On a sheet of black paper, draw two concentric circles, the outer circle with a diameter equal to the diameter of a circular dehydrator screen minus  $\frac{3}{4}$  inch and the inner circle with a diameter equal to the diameter of the hole at the center of the screen plus  $\frac{3}{4}$  inch. Cut along the circumference of each of the two circles thus producing a doughnut-shaped form, hereinafter called the screen-form, with the same shape as, but somewhat smaller in size than, a dehydrator screen.

1     6.4 OPERATION OF EQUIPMENT USED IN MANUFACTURE OF INVENTION

2     6.4.1 Operation of the Kitchen Mill

3     The method for using the Kitchen Mill Flour Mill for milling  
4     sprouts is as follows:

5     (1) Refrigerate the flour mill until its mounted thermometer  
6     reads less than 50° F.

7     (2) Measure out the required amount of dried sprouts.

8  
9     (3) Select the Kitchen Mill's "Fine Flour Texture Setting" by  
10    turning the arrow on the rotary dial to the smallest dot, and  
11    turn on the Kitchen Mill.

12    (4) Place 1 cup of dried sprouts in the hopper of the mill.  
13    The dried sprouts will be milled to flour and fall onto the  
14    long stem of the thermometer mounted transverse the flour  
15    mill pan. Whenever the thermometer records a temperature  
16    greater than 104° F, refrigerate the mill until the  
17    temperature has dropped below 70° F and continue milling the  
18    flour. Continue in this way until all the sprouts have been  
19    milled.

20    6.4.2 Method of Use of Despoked Trays and Screen-Forms

21    After preparing the batter to be dehydrated, proceed as  
22    follows:

23    (1) Place an 18 by 18 inch sheet of white paper on a flat  
24    surface. Place the screen-form made by the "Method of  
25    Manufacture of Despoked Trays and Screen Forms" described in  
26    §6.3.1 of this specification in the center of the white sheet  
27    of paper. Place a 1/4th inch thick flat sheet of transparent

1 lead-free glass or FDA approved plastic over the pieces of  
2 paper. The outline of the black screen-form can now be seen  
3 through the glass or plastic sheet.

4 (2) Record the time. Wait until the batter has sufficiently  
5 thickened that it will hold its shape when the following step  
6 is performed.

7 (3) Pour the batter to be dehydrated on the glass or plastic  
8 transparent sheet just over the place where the screen-form  
9 can be seen through the transparent sheet. Contour the batter  
10 to the shape of the screen-form as seen through the  
11 transparent sheet. Spread the batter smoothly to a uniform  
12 thickness on the transparent sheet avoiding the central hole  
13 of the screen-form as seen through the transparent sheet.  
14 (Or, the batter may be spread uniformly within the outer  
15 circumference of the screen-form as seen through the  
16 transparent sheet even covering up the central hole. Then a  
17 hole can be formed in the middle of the batter the same size  
18 as the central hole as seen through the transparent sheet.)

19 (4) As the batter rests on the transparent sheet, the chia  
20 seeds in the batter gradually absorb liquid from the batter  
21 making the batter firmer and sturdier. Eventually a point in  
22 time is reached where the batter is sufficiently sturdy that  
23 it can be sliced and lifted off of the transparent sheet  
24 without breaking apart. Therefore, let the batter on the  
25 transparent sheet set until it is firm enough to be sliced  
26 and lifted off the transparent sheet with a spatula without  
27 breaking. (This time should be in the order of about 45  
28 minutes for batters containing a sweetener and about 15  
29 minutes for batters containing little or no sweeteners. This  
30 is because chia seed not only more slowly absorbs water but  
31 also much less water in a given period of time the larger the  
32 ratio of sweeteners to water.) When the batter has become

1 sturdy enough to be lifted off of the transparent sheet  
2 without falling apart, it is also of sufficient firmness to  
3 be placed on a screen without significant leakage through the  
4 screen apertures.

5 (5) Slice the batter lengthwise into long slices (no more  
6 than about 2 inches wide). Measure the length of the blade of  
7 the spatula to be used at step 5 to lift the slices of batter  
8 off of the transparent sheet, and slice the batter crosswise  
9 into pieces of that length.

10 (6) Place a circular screen in a dehydrator tray. Using a  
11 spatula, lift the slices of batter off the transparent drying  
12 sheet and place on the circular screen, so that the slices  
13 are parallel to one another with slight spaces between the  
14 individual slices (for ventilation purposes). These long  
15 slices of batter should fit perfectly onto a single  
16 dehydrator screen. Now, slice the 2 inch wide batter slices  
17 into 1/4 inch by 1 inch rectangles.

18 (7) Place the dehydrator tray with its slices of batter onto  
19 the dehydrator base unit. Place the despoked tray made by the  
20 "Method of Manufacture of Despoked Trays and Screen Forms"  
21 described in §6.3.1 of this Specification above the  
22 dehydrator tray having the batter. Now place an empty  
23 dehydrator tray on the despoked dehydrator tray. (This  
24 provides additional "head room" and ventilation for the  
25 drying batter.)

26 (8) Place the insulated dehydrator cover on the top tray to  
27 minimize heat loss during the dehydration process. Set the  
28 rotary temperature selection dial to indicate a temperature  
29 of 104° F (40° C)., and turn on the dehydrator.



1 6.5 DESCRIPTION OF PREFERRED METHOD TO MANUFACTURE INVENTION

2 6.5.1 Introduction

3 6.5.1.1 Circumstances of Conception

4 "It is the glory of God to conceal a thing; but the honor  
5 of kings is to search out a matter." Proverbs 25:2

6 A brief word about how Applicant happened to invent his  
7 new line of products is in order.

8 After noticing that when chia seed is soaked in an aqueous  
9 mixture of carob powder and honey, it tends to absorb the  
10 honey and become coated with the carob powder, Applicant  
11 considered making a carob coated chia seed breakfast cereal.  
12 This cereal was to consist of discrete chia seeds, each seed  
13 coated with carob powder, and the carob powder being held to  
14 the surface of the chia seed by the honey which the chia seed  
15 had absorbed from the mixture. This cereal was to be called  
16 "Chia Royale". A mixture of 8 ounces of honey, 4 ounces of  
17 apple concentrate, 8 ounces of carob powder, 8 ounces of chia  
18 seed, and three pints of distilled water was prepared. After  
19 being stirred, the mixture was allowed to sit for one hour  
20 and 40 minutes, and then it was poured on dehydrator solid  
21 sheets in dehydrator trays. Twelve ounces of batter was  
22 poured onto each solid sheet.

23 The next day, it was noticed that this batter consisting  
24 of slightly germinated chia seed, carob powder, honey, apple  
25 concentrate, and water, instead of breaking up into discrete  
26 particles, was becoming a solid flexible mat. This mat was  
27 then sliced into squares. After drying for a few days, the  
28 result was a very flexible delicious cracker. But Applicant  
29 realized that this was not the essential invention. Applicant

1 now had to see what the result would be of dehydrating a  
2 batter consisting of just chia seed and water alone. It was  
3 suspected that if the end result were a cracker, the cracker  
4 would be so exceedingly fragile that with the slightest jar,  
5 it would separate into its individual seeds.

6 Four ounces of chia seed was stirred into 1.5 pounds of  
7 110° F (43 C) water. After stirring well, the mixture was  
8 allowed to set for 50 minutes. This mixture was then poured  
9 onto a solid sheet in a dehydrator tray. The dehydrator tray  
10 was placed on a Harvest Maid FD-1000 dehydrator which had  
11 been preheated to 115° F (46 C). The next morning, the drying  
12 batter was examined. It seemed to be holding together much  
13 better than expected. The batter was then sliced into  
14 squares. The pie-shaped batter was turned over and put back  
15 on the dehydrator tray.

16 The drying batter was checked that evening, and it  
17 appeared to be about 70% dry. The next morning, the batter  
18 was checked again and it was now thoroughly dry. Holding a  
19 piece in his hand, Applicant bent a thin piece of the dried  
20 chia seed batter and noted that it broke fairly easily.  
21 Taking another piece in his hands, Applicant tried to stretch  
22 it and noted that it had great tensile strength and could not  
23 be easily pulled apart. So Applicant realized that slightly  
24 germinated chia seed would be an excellent substitute for  
25 gluten in certain applications. Further, it was noted that  
26 crackers made of slightly germinated chia seed alone have a  
27 pleasant taste and make an excellent snack food.

28 Recently, Applicant tried again to make a carob coated  
29 chia seed breakfast cereal. This cereal was to consist of  
30 discrete chia seeds each seed coated with carob powder, the  
31 carob powder being held to the surface of the chia seed by  
32 the agglutinating properties of chia seed. Applicant mixed 6

1 ounces of carob powder with 8 ounces of water, and stirred  
2 0.6 ounces of chia seed into the carob-water mixture.  
3 Applicant figured that the high by weight ratio of carob  
4 powder to chia seed would ensure that each chia seed would be  
5 thoroughly coated with carob powder and, consequently, would  
6 not stick to adjacent chia seeds. When this mixture was  
7 dehydrated, however, the resultant product was hard and had  
8 great tensile strength. Apparently the seed coat of the chia  
9 seed dissolves in water and disperses throughout the water  
10 thus agglutinating the carob powder, resulting in a very hard  
11 end product.

12 Next applicant stirred 8 ounces of chia seed into 10 pints  
13 of water, and attempted to separate the chia seeds'  
14 agglutinant from the chia seed. Applicant succeeded by  
15 pouring some of the wet chia seed into a kitchen strainer,  
16 and forcing the chia seed against the strainer openings with  
17 a curved bowl, thus pushing a slimy liquid through the  
18 strainer openings. Applicant calls this slimy liquid the  
19 "chia agglutinant". In this way, Applicant separated out 9  
20 ounces of a water and chia agglutinant mixture. This mixture  
21 is colorless, clear, practically tasteless, and slimy to the  
22 touch. For comparison, Applicant made a carob and water  
23 mixture and dehydrated it. The result was a soft carob  
24 confection which had moderate tensile strength. Next  
25 Applicant stirred 3 ounces of carob powder into 4 ounces of  
26 the water-chia agglutinant mixture and dehydrated it. The  
27 result was a hard crisp product with great tensile strength.  
28 Finally, Applicant dehydrated 5 ounces of the water and chia  
29 agglutinant mixture on a dehydrator solid sheet. The result  
30 was a very thin transparent film on the dehydrator sheet  
31 which weighed less than 0.01 ounce. Apparently, a small  
32 amount of this agglutinant has great agglutinating power.

1     6.5.1.2 Species, Varieties, and Subvarieties of Invention

2             Applicant's invention has three species:

3     (1) Chia crackers in which dehydration is utilized to reduce  
4     the water activity of the crackers. This is the preferred  
5     embodiment of applicant's invention. For short term storage  
6     (one week or less), the water activity need only be reduced  
7     to less than 0.80. A water activity of less than 0.80  
8     suppresses the growth of many bacteria, yeasts, and molds.  
9     For longer term storage, the water activity should be reduced  
10    to below 0.60. A water activity below 0.60 will not support  
11    microbial growth. Most preferably, however, the water  
12    activity of the crackers is reduced below 0.40, and the  
13    crackers are placed in an area in which the relative humidity  
14    is 0.65. The crackers are then allowed to rehydrate until  
15    their water activity is 0.65. This rehydration step makes the  
16    crackers somewhat moister and easier to chew.

17    (2) Chia crackers in which establishment of an osmotic  
18    pressure differential is used to reduce the water activity of  
19    the crackers. For short term storage (one week or less), the  
20    water activity need only be reduced to less than 0.80. A  
21    water activity of less than 0.80 suppresses the growth of  
22    many bacteria, yeasts, and molds. For longer term storage,  
23    the water activity should be reduced to below 0.60. A water  
24    activity below 0.60 will not support microbial growth.

25    (3) An agglutinant derived from wet slightly germinated chia  
26    seed. A tiny amount of this agglutinant is effective in  
27    agglutinating a batter consisting of other ingredients.

28    There are two varieties of each of the first two species:  
29    Chia crackers prepared with a sweetener and chia seed  
30    crackers prepared without a sweetener.

1 There are four subvarieties of the "without-sweetener"  
2 variety: Plain Chia Crackers, the Unmilled Chia Cracker, Chia  
3 and Sprouted Wheat Crackers and the Chia Vegetable Snack.  
4 There are three subvarieties of the "with-sweetener" variety:  
5 Sweetened Chia Crackers, Carob Flavored Chia Crackers, and  
6 the Chia Fruit Snack.

#### 7 6.5.2 The Method:

8 NOTE 1: In each of the below methods, the water activity of  
9 the batter is reduced. Some of the methods utilize  
10 dehydration to reduce water activity; others of the methods  
11 use Osmotic Pressure Differential Establishment to reduce  
12 water activity: For short term refrigerated storage (one week  
13 or less), the water activity is reduced below 0.80. For  
14 longer term storage the water activity is reduced below 0.60.  
15 Most preferably, however, the water activity of the crackers  
16 is reduced below 0.40, and the crackers are placed in an area  
17 in which the relative humidity is 0.65. The crackers are then  
18 allowed to rehydrate until their water activity is 0.65. This  
19 rehydration step makes the crackers somewhat moister and  
20 easier to chew. The term "water activity" ( $a_w$ ) is used herein  
21 in its usual context to mean the ratio of the fugacity of  
22 water in the system being studied ( $f$ ) to the fugacity of pure  
23 water ( $f_0$ ) at the same temperature. Hence the water activity  
24 of pure water is 1.00. The water activity of the products and  
25 compositions herein can be measured using well-known physical  
26 chemical techniques and commercially available instruments.)  
27 By "water activity reduction" is meant mean any process and  
28 its associated equipment which can be used to reduce the  
29 amount of water in a product which is available for the  
30 growth of microorganisms. Each group of microorganisms has a  
31 different minimum water requirement to support growth. The  
32 purpose of water activity reduction methods is to reduce the  
33 amount of water in a product which is available to

1 microorganisms in order to suppress their growth so that  
 2 these products will be stable under storage conditions. For  
 3 short term refrigerated storage (a week or so), it is  
 4 sufficient to reduce the water activity of a product below  
 5 0.80. For longer term storage, the water activity should be  
 6 reduced below 0.60, which is lower than the lowest of the  
 7 minimum requirements for microorganisms. If microorganisms  
 8 are sufficiently deprived of water, they will no longer grow.  
 9 The following table from page 10 of the fourth edition of  
 10 "Food Microbiology" by Frazier and Westhoff (McGraw-Hill Book  
 11 Company, 1988) shows the lowest water activity values  
 12 permitting growth of spoilage organisms:

| 13 | <u>Group of microorganisms</u>               | <u>Minimal <math>a_w</math> value</u> |
|----|--|---------------------------------------|
| 14 | Many bacteria                                | 0.91                                  |
| 15 | Many yeasts                                  | 0.88                                  |
| 16 | Many molds                                   | 0.80                                  |
| 17 | Halophilic ("salt tolerant") bacteria        | 0.75                                  |
| 18 | Xerophilic ("drought tolerant") fungi        | 0.65                                  |
| 19 | Osmophilic ("high osmotic pressure tolerant" | 0.60                                  |
| 20 | yeasts                                       |                                       |

21 In order to inhibit the growth of many bacteria, yeasts,  
 22 and molds, the processing steps used to produce Applicant's  
 23 invention include the step of reducing the water activity of  
 24 the products to less than 0.80. Preferably the water activity  
 25 of these products is reduced to less than 0.65 to inhibit the  
 26 growth of xerophilic fungi. More preferably the water  
 27 activity of these products is reduced to less than 0.60 to  
 28 inhibit the growth of all microorganisms. Products with a  
 29 water activity of less than 0.80 are suitable for short term  
 30 refrigerated storage. Products with a water activity of less  
 31 than 0.60 are suitable for longer term storage. Most  
 32 preferably, however, the water activity of these products is  
 33 reduced below 0.40, and the crackers are placed in an area in

1 which the relative humidity is 0.65. The crackers are then  
2 allowed to rehydrate until their water activity is 0.65. This  
3 rehydration step makes the crackers somewhat moister and  
4 easier to chew.

#### 5 6.5.2.1 Chia Crackers Prepared by the Dehydration Method of 6 Water Activity Reduction

7 NOTE: For best results, the relative humidity of the  
8 atmosphere about the drying batter should be maintained below  
9 40%, and preferably even lower. The lower the relative  
10 humidity of the atmosphere about the drying batter, the  
11 quicker will dehydration of the batter proceed, thus giving  
12 the lactic acid bacteria in the batter a much shorter time in  
13 which to produce lactic acid before the water activity of the  
14 drying batter drops below 0.91. (0.91 is the minimum water  
15 activity level required to support bacterial growth.)  
16 Further, the relative humidity of the atmosphere about the  
17 drying batter must be prevented from rising above 100% times  
18 the desired water activity of the final product. For example,  
19 if the desired water activity of the product is 0.35, the  
20 relative humidity of the atmosphere about the drying batter  
21 should be maintained below 35%. Keeping the relative humidity  
22 below 40% greatly reduces drying time, thus reducing  
23 bacterial souring, and preventing mold. If, at any time, the  
24 relative humidity is allowed to climb above 70%, molding is  
25 encouraged. Keeping relative humidity below 70 percent is  
26 absolutely essential to product success. If this is not done,  
27 product success is unlikely regardless of what other measures  
28 are employed.

29 It is preferred that the operations of dehydrating the  
30 sprouts, preparing the cracker batter, and dehydrating the  
31 cracker batter be performed in a closed room or area in order  
32 that the temperature and relative humidity of the atmosphere

1 about the drying products can be carefully controlled.  
2 Throughout this specification, the term "Preparation Room"  
3 will be used to refer to the closed room or area in which  
4 product preparation activities which involve dehydration take  
5 place. It is preferred that the temperature in the  
6 Preparation Room be maintained in the range of 90° to 104° F,  
7 and that the relative humidity of the air (atmosphere) in the  
8 Preparation Room be maintained below 40%.

9 For each of the methods below, it is preferred that one  
10 additional step be added after the water activity of the  
11 sliced batter is lowered to its final value. This step is to  
12 again rehydrate the sliced batter pieces until their water  
13 activity is between 0.60 and 0.70, and most preferably 0.65.  
14 This can be done by leaving the crackers in refrigerated  
15 storage with the relative humidity of the refrigerated  
16 storage area set at a carefully controlled 65%. Every day or  
17 so the water activity of the sliced batter is checked, and  
18 when the water activity of the sliced batter is 65%, the  
19 sliced batter pieces are packaged in a room whose relative  
20 humidity is 65%. Crackers with a water activity of 65% are  
21 moister and much easier to chew than crackers with a lower  
22 water activity.

#### 23 6.5.2.1.1 Method for Plain Chia Crackers

24 The only ingredient in these crackers is unmilled whole  
25 slightly germinated chia seed. Hence the CFA of these  
26 crackers is 1.0. As will be shown, the crackers, although not  
27 containing any gluten, hold together well. The optimal amount  
28 of water required at step 2 seems to be about twice the  
29 weight of the chia seed used. If less water is used, the chia  
30 seed batter is extremely difficult to spread. If much more  
31 water is used, some of the water will drip through the  
32 screens. Further, dehydration time and electric costs climb



1 proportionally. As noted in the discussion of background art,  
2 chia seed will eventually absorb about twelve times its  
3 weight of water. With all of the below products, the amount  
4 of chia seed, water, and other ingredients can be varied. As  
5 a rough rule of thumb, when adding or subtracting one part of  
6 chia seed, at least 6 parts of water should be added or  
7 subtracted for best results. One part of a poorly absorbent  
8 seed like sesame seed requires about one part of water to be  
9 added. One part of a milled grain requires about 1.3 parts of  
10 water to be added. One part of honey actually requires a  
11 reduction in the amount of water used due to the osmotic  
12 pressure effect. (Osmotic pressure is the force created  
13 across a semipermeable membrane—in this case, the cell walls  
14 of the chia seeds—separating two solutions of different  
15 concentrations. It results in the passage of water from the  
16 region of its greater concentration to a region of its lesser  
17 concentration.) Chia seed absorbs less water from sweetened  
18 liquids thus requiring the use of less water. If too much  
19 sweetener is used, however, the chia seeds will not absorb  
20 any water from the sweetened liquid, and its purpose in this  
21 invention will not be realized.

22 The method for making plain chia crackers is as follows:

23 1. Utilize a dehumidifier to reduce the relative humidity of  
24 the room in which the product will be made to less than  
25 40%. (If the relative humidity climbs above about 65%,  
26 mold may form on the drying batter.)

27 2. Pour 2 pounds 14 ounces of 104° F (40° C) distilled water  
28 into a suitably sized round stainless steel or plastic  
29 container (the mixing container) which complies with FDA  
30 regulations.

31 3. While stirring vigorously, very slowly pour 1 pound 7

1 ounces of certified chemical-free whole chia seed into  
2 the mixing container near its inside wall (no more than  
3 about 1/300 of an ounce of chia seed per revolution of  
4 the mixing paddle per square inch of the surface area of  
5 the mixture in the mixing container), and stir vigorously  
6 for five minutes. This vigorous stirring further reduces  
7 the possibility of the chia seed clumping together, and,  
8 consequently, not being evenly wet by water.

9 4. The batter for the Plain Chia Crackers consists of 1  
10 pound 7 ounces of chia seed and 2 pounds 14 ounces of  
11 distilled water. Thus, total solids is 23 ounces and the  
12 total water is 46 ounces. (Thus the batter is one-third  
13 solids and two-thirds water.) Remove 1.5 ounces of  
14 batter. Determine the pH value of a 6:1 slurry of this  
15 batter as follows: 1.5 oz. of this batter consists of 0.5  
16 oz. of chia seeds and 1 oz. distilled water. In other  
17 words, this batter consists of 0.5 oz. of solids and 1  
18 oz. of water. Add 2 oz. of distilled water to the 1.5 oz.  
19 of batter to make a 6:1 slurry, and stir well. Its  
20 composition, is now 3 oz. water and 0.5 oz. of solids.  
21 Measure the pH value of this 6:1 slurry. It should be  
22 about 6.0. Call the measured pH of this 6:1 slurry pH<sub>0</sub>.

23 5. Allow this batter to set for 10 minutes. (After 10  
24 minutes, the batter should have thickened enough so that  
25 it can be spread on circular dehydrator screens 24 (Figs.  
26 1 and 4) instead of needing to be spread upon circular  
27 dehydrator sheets.)

28 6. Place a 19 inch diameter pizza platter on a table.

29 7. Place a circular dehydrator screen 24 on the pizza  
30 platter.

- 1     8. Pour the batter onto the circular screen 24.
  
- 2     9. Evenly spread the batter 22 around on the screen 24,  
 3       avoiding, of course, the screen's center hole 26. (The  
 4       pizza platter keeps the batter from squeezing through the  
 5       screen openings as pressure is applied.) Figure 1 shows  
 6       the batter 22 evenly spread around on the screen 24.
  
- 7     10. Lift the screen 24 with the batter on it and place it  
 8       onto a dehydrator tray. Place another screen on top of  
 9       the batter, and invert and fit another dehydrator tray on  
 10      top of the first dehydrator tray. (Each dehydrator tray  
 11      has a circular wall surrounding the center hole with  
 12      openings in the wall for air circulation. When one  
 13      dehydrator tray is inverted and fitted on the other  
 14      dehydrator tray, these walls interlock forming a tightly  
 15      fitting two tray assembly.)
  
- 16    11. Flip this two-tray assembly, and remove the top  
 17      dehydrator tray and screen. (Since the batter is moist,  
 18      the screen should peel away easily.) The batter is now  
 19      sitting upon a screen, onto which it was never pressed by  
 20      the pressure of spreading. Consequently, after the batter  
 21      has dried, it will not stick to this screen, and the  
 22      screen can be easily removed.
  
- 23    12. Place the lower dehydrator tray which contains the batter  
 24      on the dehydrator base unit. Place an empty dehydrator  
 25      tray on top of the tray containing the batter. (This  
 26      provides additional ventilation.) Place the insulated  
 27      dehydrator cover on the top tray to minimize heat loss  
 28      during the dehydration process. Set the rotary  
 29      temperature selection dial of the dehydrator to indicate  
 30      a temperature of 104° F (40° C). Turn on the dehydrator.

13. Thirty minutes after step 12, slice the drying batter into 1/4 inch by 1 inch rectangles, and put the tray back on the dehydrator base unit. The slicing of the batter into thin slices breaks the drying crust of the batter in many places allowing moisture to evaporate through the slice marks and greatly reduces drying time. (Fig. 2 shows a batter 22 sliced into rectangles 30 approximately 2" by 2 1/2". A typical slice mark is shown at 28.)

15 14. Every 30 minutes for the next three hours, re-slice the  
16 drying batter into the rectangles 30 of step 13.

17 15. Continue to dehydrate the batter until its water activity  
18 has been reduced below 0.60, and preferably below 0.40.  
19 The result is plain chia crackers. A diagrammatic  
20 perspective view of a cracker is generally shown by 30 of  
21 Figure 3. A diagrammatic representation of a chia seed is  
22 shown by 32.

23 16. Determine the cross-sectional area and tensile strength  
24 of a typical cracker. (Tensile strength is the resistance  
25 of a material to a force tending to tear it apart.)

17. Mill 0.5 oz. of crackers and prepare a 6:1 slurry from 3  
oz. of distilled water and 0.5 oz. of crackers. Measure  
the pH value of this slurry. This pH value is called  $pH_f$ .  
Then  $\delta pH_{LA}$  for crackers made from whole chia seed =  $pH_o -$   
 $pH_f$ .

1 17A. Then place the crackers of Step 15 in a refrigerated  
2 area in which the relative humidity is 0.65, and allow  
3 the crackers to rehydrate until their water activity is  
4 0.65. This rehydration step makes the crackers somewhat  
5 moister and easier to chew. The result is referred to  
6 as remoistened crackers. (But be careful here; if the  
7 relative humidity is allowed to rise above 65%, mold may  
8 form on the crackers.)

9 18. In order to investigate the degree of souring which can  
10 be expected when crackers are made with milled chia seed  
11 instead of whole chia seed, perform steps 1 through 17  
12 above but using milled chia seed instead of whole chia  
13 seed at step 3. Then, perform steps 19 - 20 below.

14 19. Pour the slurry of step 17 onto a solid dehydrator sheet,  
15 and dehydrate it to a water activity of less than 0.40.

16 20. Mill the dehydrated product of step 19, and prepare a 6:1  
17 slurry from 3 oz. of distilled water and 0.5 oz. of the  
18 milled product. Measure the pH value of this slurry. This  
19 pH value is called  $pH_f$ . Then  $\delta pH_{LA}$  for crackers made from  
20 milled chia seed =  $pH_o - pH_f$ .

#### 21 6.5.2.1.2 Method for Making Unmilled Chia Crackers

22 With the exception of the powdered dulse, this cracker  
23 does not contain any milled ingredients thus providing great  
24 protection for its interior nutrients against the ravages of  
25 oxidation. Further, in the preparation of this cracker,  
26 bacterial souring simply does not take place. To summarize,  
27 since none of the ingredients are milled (except dulse by the  
28 manufacturer), there is a big energy savings here. Not only  
29 is this product completely gluten free but it provides full  
30 protection for interior nutrients against the ravages of

1    oxidation. It is very easy to prepare, can be spread very  
2    thickly on dehydrator screens, does not sour at all, and  
3    dries very quickly. These crackers have a CFA of 1.00.

4    The method for making unmilled chia crackers is as follows:

5       1. Reduce the relative humidity of the atmosphere in the  
6       Preparation Room (the closed room or area in which  
7       product preparation activities take place) to less than  
8       40%.

9       2. Pour 1 1/4 pounds of distilled water into a suitably  
10      sized round stainless steel or plastic container (the  
11      mixing container) which complies with FDA regulations.  
12      Add 12 ounces of sesame seed and 1 ounce of caraway seed,  
13      and stir well. Allow the sesame and caraway seeds to soak  
14      for at least 8 hours in order to destroy some of the  
15      enzyme inhibitors in the seeds and to increase enzymatic  
16      activity slightly.

17      3. Measure out:

- 18          (a) 1.5 pounds of certified chemical-free chia seed  
19          (b) 1.5 ounces of certified chemical-free dried teff  
20              sprouts (from teff grain which has been sprouted for  
21              24 hours and then dried to a water activity of 0.40).  
22          (c) 3 ounces of dulse powder

23      4. Pour an additional 3 1/4 pounds of 104° F (40° C) water  
24      into the mixing container, add dulse powder, and stir  
25      well. Add teff sprouts and stir well. (Since teff is the  
26      smallest of all seeds, the dried teff sprouts in the  
27      product are very easy to chew. The method for growing  
28      teff sprouts is similar to the method for growing alfalfa  
29      sprouts and is well known to those skilled in the art.)

- 1      5. While stirring vigorously, very slowly pour chia seed  
2      into the mixing container near its inside wall (no more  
3      than about 1/300 of an ounce of chia seed per revolution  
4      of the mixing paddle per square inch of the surface area  
5      of the mixture in the mixing container), and stir  
6      vigorously for five minutes.
- 7      6. The batter for the Unmilled Chia Crackers consists of 1  
8      pound 8 ounces of chia seed, 12 ounces sesame seed, 1  
9      ounce caraway seeds, 1.5 ounces of teff sprouts, 3 ounces  
10     of dulse powder, and 4 pounds 8 ounces of distilled  
11     water. Thus, total solids is 41.5 ounces and the total  
12     water is 72 ounces. (Thus the batter is 36.6 percent  
13     solids and 63.4 percent water.) Remove 1.5 ounces of  
14     batter. Determine the pH value of a 6:1 slurry of this  
15     batter as follows: 1.5 oz. of this batter consists of  
16     0.55 oz. of solids and 0.95 oz. distilled water. Add 2.35  
17     oz. of distilled water to the 1.5 oz. of batter to make a  
18     6:1 slurry, and stir well. Its composition, is now 3.3  
19     oz. water and 0.55 oz. of solids. Measure the pH value of  
20     this 6:1 slurry. It should be about 6.0. Call the  
21     measured pH of this 6:1 slurry  $pH_0$ .
- 22     7. Let set for 20 minutes. During this 20 minute period, the  
23     chia seeds absorb water from the surrounding batter, thus  
24     thickening it. (If less water is used at Step 4, this 30  
25     minute wait can be reduced correspondingly, but the  
26     batter will be somewhat harder to spread at Step 11.)
- 27     8. Place a 19 inch diameter pizza platter on a table.
- 28     9. Place the first or next circular dehydrator screen on the  
29     pizza platter.
- 30     10. Pour 3 ½ pounds of batter onto the circular screen.

- 1 11. Spread the batter evenly around on the screen, avoiding,  
2 of course, the screen's center hole.
- 3 12. Lift the screen with the batter on it, and place it onto  
4 the first or next dehydrator tray. Place another screen  
5 on top of the batter, and invert and fit another  
6 dehydrator tray on top of the dehydrator tray containing  
7 the batter, such that the center walls of the two trays  
8 interlock.
- 9 13. Flip this two-tray assembly, and remove the top  
10 dehydrator tray and screen.
- 11 14. Place the lower dehydrator tray with the batter on the  
12 dehydrator base unit. Place an empty dehydrator tray on  
13 top of the tray containing the batter. (This provides  
14 additional ventilation.)
- 15 15. Repeat steps 9-14 until all of the batter has been placed  
16 on dehydrator trays. This procedure should yield 2 trays  
17 of batter. Place the insulated dehydrator cover on the  
18 top tray to minimize heat loss during the dehydration  
19 process.
- 20 16. Set the rotary temperature selection dial to indicate a  
21 temperature of 104° F (40° C). Turn on the dehydrator.
- 22 (An alternate to steps 7-16 above is given in §6.4.2, Method  
23 of Use of Despoked Trays and Screen-Forms. The chief  
24 advantage of this alternate method is it eliminates the  
25 tremendous effort required to spread the batter in step 11  
26 above. The chief disadvantage of this alternate method is  
27 that it means one extra drying surface to be cleaned.)
- 28 17. Thirty minutes after step 16, slice the drying batter in



1       each tray into 1/4 inch by 1 inch rectangles, and put the  
2       trays back on the dehydrator base unit.

3       18. Every 30 minutes for the next three hours, re-slice the  
4       drying batter in each tray into the rectangles of step  
5       17.

6       19. Continue to dehydrate the batter until its water activity  
7       has been reduced below 0.60, and preferably below 0.40.  
8       The result is unmilled chia crackers.

9  
10      20. Mill 0.5 oz. of crackers, and prepare a 6:1 slurry from 3  
11      oz. of distilled water and 0.5 oz. of crackers. Measure  
12      the pH value of this slurry. This pH value is called  $pH_f$ .  
13      Then  $\delta pH_{LA} = pH_o - pH_f$ .

14      21. Then place the crackers of Step 19 in a refrigerated area  
15      in which the relative humidity is 0.65, and allow the  
16      crackers to rehydrate until their water activity is 0.65.  
17      This rehydration step makes the crackers somewhat moister  
18      and easier to chew. The result is referred to as  
19      remoistened crackers. (But be careful here; if the  
20      relative humidity is allowed to rise above 65%, mold may  
21      form on the crackers.)

#### 22      6.5.2.1.3 Method for Making Chia and Sprouted Wheat Crackers

23      This cracker contains both chia seed and the  
24      gluten-bearing ingredient, sprouted wheat. It is, therefore,  
25      a very sturdy product. 1.5\*MAA of chia seed is used to  
26      prepare these crackers, and the CFA for these crackers is  
27      0.61. The highest CFA for Applicant's early experimental  
28      batch of crackers was 0.5 which was considered such a failure  
29      that the highest CFA for any succeeding early batch was only  
30      0.2. This method uses dehydrated sprouted wheat at step 2.

1 The method for sprouting wheat is well known to those who are  
2 skilled in the art. After the wheat is sprouted (for about 18  
3 hours), it is then dehydrated at a temperature of 104° F (40°  
4 C) by methods well known to those who are skilled in the art.

5 The method for making chia and sprouted wheat crackers  
6 follows:

- 7 1. Reduce the relative humidity of the atmosphere in the  
8 Preparation Room (the closed room or area in which  
9 product preparation activities take place) to less than  
10 40%.
- 11 2. Mill 1 pound 5 ounces of certified organic or certified  
12 chemical-free dehydrated sprouted wheat.
- 13 3. Measure out the following ingredients:
  - 14 a. 1 pound 5 ounces of certified chemical-free sesame  
15 seed
  - 16 b. 2 pounds 1 ounce of certified chemical-free chia seed.
- 17 4. Pour 4 pounds 11 ounces of 104° F (40° C) water into a  
18 suitably sized round stainless steel or plastic container  
19 (the mixing container) which complies with FDA  
20 regulations.
- 21 5. Pour milled wheat sprouts into the mixing container and  
22 stir well.
- 23 6. Pour sesame seed into the mixing container and stir well.
- 24 7. While stirring vigorously, very slowly pour chia seed  
25 into the mixing container near its inside wall (no more  
26 than about 1/300 of an ounce of chia seed per revolution  
27 of the mixing paddle per square inch of the surface area

- 1 of the mixture in the mixing container), and continue to  
2 stir vigorously for 5 minutes.
- 3 8. Allow the batter in the mixing container to set for 20  
4 minutes before proceeding.
- 5 9. Place a 19 inch diameter pizza platter on a table.
- 6 10. Place the first or next circular dehydrator screen on the  
7 pizza platter.
- 8 11. Pour 4 pounds 11 ounces of batter onto the screen, and  
9 spread the batter evenly around on screen.
- 10 12. Lift the screen with the batter on it and place it onto  
11 the first or next dehydrator tray. Place another screen  
12 on top of the batter, and invert and fit another  
13 dehydrator tray on top of this dehydrator tray such that  
14 the center walls of the two trays interlock.
- 15 13. Flip this two-tray assembly, and remove top dehydrator  
16 tray and screen.
- 17 14. Place the lower dehydrator tray with the batter on it  
18 onto the dehydrator base unit. Place an empty dehydrator  
19 tray on top of the tray containing the batter. (This  
20 provides additional ventilation.)
- 21 15. Repeat steps 10-14 until all the batter in the mixing  
22 container has been placed on dehydrator trays on the  
23 dehydrator base unit. There should now be two trays of  
24 batter on the dehydrator base unit. Place the insulated  
25 dehydrator cover on the top tray to minimize loss of heat  
26 during the dehydration process. Set the rotary  
27 temperature selection dial to indicate a temperature of

1           104° F (40° C). Turn on the dehydrator.

2       An alternate to steps 8-15 above is given in §6.4.2, Method  
3       of Use of Despoked Trays and Screen-Forms. The chief  
4       advantage of this alternate method is it eliminates the  
5       tremendous effort required to spread the batter in step 11  
6       above. The chief disadvantage of this alternate method is  
7       that it means one extra drying surface to be cleaned.)

8       16. Thirty minutes after step 15, slice each tray's drying  
9       batter into 1/4 inch by 1 inch rectangles, and put the  
10       trays back on the dehydrator base unit. (Slicing the  
11       batter into very thin rectangles speeds drying and  
12       inhibits bacterial souring.)

13       17. Every 30 minutes for the next three hours, re-slice each  
14       tray's drying batter into the rectangles of step 16.

15       18. Continue to dehydrate the batter until its water activity  
16       has been reduced below 0.60, and preferably below 0.40.  
17       Then place this product in a refrigerated area in which  
18       the relative humidity is 0.65, and allow the product to  
19       rehydrate until its water activity is 0.65. This  
20       rehydration step makes the product somewhat moister and  
21       easier to chew. The result is referred to as remoistened  
22       crackers. (But be careful here; if the relative humidity  
23       is allowed to rise above 65%, mold may form on the  
24       product.)

#### 25       6.5.2.1.4 Method for Making the Chia Vegetable Snack

26       The following method can be used for agglutinating a wide  
27       variety of foods from the vegetable kingdom. The term "foods  
28       from the vegetable kingdom" is meant to include any edible  
29       food of vegetarian origin and includes fruits, vegetables,

1 both sprouted and unsprouted grains, both fruit and vegetable  
 2 syrups, honey, tree syrups, and bee pollen. Therefore the  
 3 only foods not within the contemplation of this invention are  
 4 the flesh of animals, fish, birds, and insects, and inedible  
 5 foods of vegetarian origin. According to *How to Dry Foods* by  
 6 Deanna DeLong (HPBooks, A division of Price Stern Sloan,  
 7 Inc., 360 N. LaCienega Blvd., Los Angeles, CA 90048, 1979),  
 8 some of the suitable fruits for dehydration are apples,  
 9 apricots, bananas, blueberries, cherries, citrus fruits,  
 10 coconuts, cranberries, currants, dates, figs, grapes, melons,  
 11 nectarines, papayas, peaches, pears, persimmons, pineapples,  
 12 plums, prune plums, rhubarb, and strawberries. Some of the  
 13 suitable vegetables for dehydration are artichokes, beets,  
 14 broccoli, cabbages, carrots, garlic, horseradish, kohlrabi,  
 15 mushrooms, okra, onions, parsley, parsnips, red and green  
 16 peppers, chili peppers, potatoes, pumpkins, rutabagas, summer  
 17 squash, sweet potatoes, tomatoes, turnips, yams, zucchini,  
 18 and cured olives. So that the vegetables used will not  
 19 significantly deteriorate during drying, the vegetables must  
 20 be sliced into sections which are not larger than  $\frac{1}{2}$  inch on a  
 21 side. Preferably, the vegetables should be sliced into  
 22 sections which are not larger than  $\frac{1}{4}$  inch on a side. Most  
 23 preferably the vegetables used for Chia Vegetable Snacks  
 24 should be sliced into even smaller pieces or shredded using  
 25 the Presto SaladShooter in order to minimize drying time. For  
 26 maximum nutritional value, it is further preferred that the  
 27 batter prepared for these snacks be spread thinly upon  
 28 dehydrator screens in order to minimize drying time. The  
 29 method below illustrates snacks prepared with shredded  
 30 carrots and broccoli, and the final product is very colorful:  
 31 thin orange strips of carrot are interspersed with thin green  
 32 strips of broccoli. Further, although these snacks are  
 33 completely gluten-free, they are very sturdy and clearly  
 34 demonstrate the ability of chia seed to agglutinate various  
 35 vegetables. The CFA for this snack food is 1.00, thus further

1 demonstrating chia seed's agglutinative powers.

2 The method for making the chia vegetable snack is as follows:

3 1. Reduce the relative humidity of the atmosphere in the  
4 Preparation Room (the closed room or area in which  
5 product preparation activities take place) to less than  
6 40%.

7 2. Pour 24 ounces of distilled water into a suitably sized  
8 round stainless steel or plastic container (the mixing  
9 container) which complies with FDA regulations.

10 3. Assemble the Presto SaladShooter electric shredder/slicer  
11 with the shredder cone, and use it to shred 5 ounces of  
12 carrots and 5 ounces of broccoli stalks.

13 4. Measure out:

14 (a) 1 pound of certified chemical-free chia seed

15 (b) 1 ounce of dulse powder

16 5. Stir the dulse powder into the water in the mixing  
17 container. Add the shredded carrots and broccoli, and  
18 stir well.

19 6. While stirring vigorously, very slowly pour the chia seed  
20 into the mixing container near its inside wall (no more  
21 than about 1/300 of an ounce of chia seed per revolution  
22 of the mixing paddle per square inch of the surface area  
23 of the mixture in the mixing container), and stir  
24 vigorously for five minutes.

25 7. Let set for 15 minutes. (If less water is used at Step 2,  
26 this 15 minute wait can be reduced correspondingly, but  
27 the batter will be somewhat more difficult to spread at

- 1       Step 11.)
- 2       8. Place a 19 inch diameter pizza platter on a table.
- 3       9. Place the first or next circular dehydrator screen on the  
4       pizza platter.
- 5       10. Pour the batter onto the circular screen.
- 6       11. Spread the batter evenly around on the screen, avoiding,  
7       of course, the screen's center hole.
- 8       12. Lift the screen with the batter on it and place it onto  
9       the first or next dehydrator tray. Place another screen  
10      on top of the batter, and invert and fit another  
11      dehydrator tray on top of the dehydrator tray containing  
12      the batter, such that the center walls of the two trays  
13      interlock.
- 14      13. Flip this two-tray assembly, and remove the top  
15      dehydrator tray and screen.
- 16      14. Place the lower dehydrator tray with the batter on the  
17      dehydrator base unit. Place an empty dehydrator tray on  
18      top of the tray containing the batter. (This provides  
19      additional ventilation.)
- 20      15. Place the insulated dehydrator cover on the top tray to  
21      minimize heat loss during the dehydration process.
- 22      16. Set the rotary temperature selection dial to indicate a  
23      temperature of 104° F (40° C). Turn on the dehydrator.
- 24      An alternate to steps 7-16 above is given in §6.4.2, Method  
25      of Use of Despoked Trays and Screen-Forms. The chief

1 advantage of this alternate method is it eliminates the  
2 tremendous effort required to spread the batter in step 11  
3 above. The chief disadvantage of this alternate method is  
4 that it means one extra drying surface to be cleaned.)

5 17. Thirty minutes after step 16, slice the drying batter in  
6 each tray into 1/4 inch by 1 inch rectangles, and put the  
7 trays back on the dehydrator base unit.

8 18. Every 30 minutes for the next three hours, re-slice the  
9 drying batter in each tray into the rectangles of step  
10 17.

11 19. Continue to dehydrate the batter until its water activity  
12 has been reduced below 0.60, and preferably below 0.40.  
13 Then place this product in a refrigerated area in which  
14 the relative humidity is 0.65, and allow the product to  
15 rehydrate until its water activity is 0.65. This  
16 rehydration step makes the product somewhat moister and  
17 easier to chew. The result is referred to as remoistened  
18 crackers. (But be careful here; if the relative humidity  
19 is allowed to rise above 65%, mold may form on the  
20 product.)

#### 21 6.5.2.1.5 Method for Making Sweetened Chia Crackers

22 Remarkably, the addition of a sweet syrup to the batter  
23 results in a very strong, flexible cracker with the  
24 organoleptic properties of dried figs (soft yet crunchy, and  
25 cohesive). The chia seed either absorbs the sweet syrup or  
26 holds it very tightly bound to itself. In the newly made  
27 product, the taste of chia seed is quite noticeable, but as  
28 the product ages, it acquires a most delightful taste which,  
29 although it is impossible to describe, substantially masks  
30 the taste of the chia seed. Applicant has not determined an



1 upper limit on the amount of sweet syrup that a given amount  
2 of chia seed can absorb or bind to itself. Large quantities  
3 of sweeteners such as the sweet syrups, however, are  
4 detrimental to one's health. The strength, flexibility, and  
5 durability of products made with chia seed and one of the  
6 sweet syrups very strongly suggest that this combination may  
7 have utility outside of the food area—perhaps as a building  
8 material in certain applications. The CFA of these crackers  
9 is 1.00.

10 It should be noted, however, that the more sweet syrup  
11 that is used in the batter, the more slowly the chia seeds  
12 will absorb water from the surrounding batter. If a  
13 considerable amount of water activity depressant is used, one  
14 might have to wait an hour or more for the chia to absorb  
15 sufficient water from the batter for the batter to be spread  
16 on screens without significant leakage through the screen  
17 apertures. Of course if one waits too long, it will be very  
18 difficult to spread the batter on the screens.

19 The method for making sweetened chia crackers is as follows:

- 20 1. Utilize a dehumidifier to reduce the relative humidity of  
21 the room in which the product will be made to less than  
22 40%. (If the relative humidity climbs above about 65%,  
23 mold may form on the drying batter.)
- 24 2. Pour 1 lb. of Nickabood's Wild Desert Honey into a  
25 suitably sized round stainless steel or plastic container  
26 (the mixing container) which complies with FDA  
27 regulations.
- 28 3. Pour 1 1/2 pounds of 104° F (40° C) distilled water into  
29 the mixing container and stir until all the honey is  
30 dissolved.

- 1     4. While stirring vigorously, very slowly pour 1 pound of  
2       certified chemical-free chia seed into the mixing  
3       container near its inside wall (no more than about 1/300  
4       of an ounce of chia seed per revolution of the mixing  
5       paddle per square inch of the surface area of the mixture  
6       in the mixing container).
- 7     5. Continue to stir the batter vigorously for five minutes.
- 8     6. Allow the batter to set for 30 minutes. (If less water is  
9       used at Step 3, this 30 minute wait can be reduced corre-  
10      spondingly, but the batter will be somewhat harder to  
11      spread at Step 10.)
- 12    7. Place a 19 inch diameter pizza platter on a table.
- 13    8. Place a circular dehydrator screen on a pizza platter.
- 14    9. Pour the batter onto the screen.
- 15    10. Spread batter evenly around on the screen, avoiding, of  
16       course, the screen's center hole.
- 17    11. Lift the screen with its batter, and place it on a  
18       dehydrator tray. Place another screen on top of the  
19       batter, and invert and fit another dehydrator tray on the  
20       first dehydrator tray such that the two trays' center  
21       walls interlock.
- 22    12. Flip this two-tray assembly, and remove the top  
23       dehydrator tray and screen.
- 24    13. Place the lower dehydrator tray with the batter on the  
25       dehydrator base unit. Place an empty dehydrator tray on  
26       top of the tray containing the batter. (This provides

1 additional ventilation.) Place the insulated dehydrator  
2 cover on the top tray to minimize loss of heat from the  
3 dehydrator.

4 14. Set the rotary temperature selection dial of the  
5 dehydrator to indicate a temperature of 104° F (40° C).  
6 Turn on the dehydrator.

7 (An alternate to steps 6-14 above is given in §6.4.2, Method  
8 of Use of Despoked Trays and Screen-Forms. The chief  
9 advantage of this alternate method is it eliminates the  
10 tremendous effort required to spread the batter in step 10  
11 above. The chief disadvantage of this alternate method is  
12 that it means one extra drying surface to be cleaned.)

13 15. Thirty minutes after step 14, slice the drying batter  
14 into 1/4 inch by 1 inch rectangles, and put the tray back  
15 on the dehydrator base unit. (It is essential that these  
16 rectangles be no thicker than 1/4 inch; cracker batter  
17 which contains both chia seed and a sweetener such as  
18 honey dries very slowly to a water activity less than  
19 0.60. If the cracker batter dries too slowly yeast and  
20 mold formation is encouraged.)

21 16. Every 30 minutes for the next three hours, re-slice the  
22 drying batter into the rectangles of step 15.

23 17. When the water activity of the drying batter drops to  
24 about 0.70, the batter should now be dry enough that the  
25 screen on which it rests can be removed without tearing  
26 the batter. To do this, proceed as follows: Remove the  
27 insulated dehydrator cover. Invert and fit another  
28 dehydrator tray on the dehydrator tray containing the  
29 batter such that the two trays' center walls interlock.  
30 Flip this two-tray assembly, and remove the top

1       dehydrator tray and screen. Place the lower dehydrator  
2       tray with the batter back on the dehydrator base unit.  
3       Replace the insulated dehydrator cover. Removing the  
4       screen will accelerate the drying of the batter.

5       18. Continue to dehydrate the batter until its water activity  
6       has been reduced below 0.60, and preferably below 0.40.  
7       Then place these resultant crackers in a refrigerated  
8       area in which the relative humidity is 0.65, and allow  
9       the crackers to rehydrate until their water activity is  
10      0.65. This rehydration step makes the crackers somewhat  
11      moister and easier to chew. The result is referred to as  
12      remoistened crackers. (But be careful here; if the  
13      relative humidity is allowed to rise above 65%, mold may  
14      form on the crackers.)

15      19. Determine the cross-sectional area and tensile strength  
16      of a typical piece of these sweetened chia crackers.

#### 17      6.5.2.1.6 Method for Making Carob Flavored Chia Crackers

18       It has been found that in products containing chia seed,  
19       honey, and, perhaps, a fruit syrup, the taste of the chia  
20       seed is somewhat noticeable (unless the product has been  
21       allowed to age for a few weeks as noted previously). The use  
22       of carob completely and effectively masks the chia seed taste  
23       resulting in very delicious products, with the organoleptic  
24       properties of dried figs (soft yet crunchy, and cohesive).

25       The method for making carob flavored chia crackers is as  
26       follows:

27       1. Utilize a dehumidifier to reduce the relative humidity of  
28       the room in which the product will be made to less than  
29       40%. (If the relative humidity climbs above about 65%,

- 1        mold may form on the drying batter.)
- 2        2. Measure out the following ingredients:
- 3            a. 1.5 pounds of carob powder (Applicant favors the use
- 4                of raw certified chemical free carob powder.)
- 5            b. 1.5 pounds of certified chemical-free chia seed
- 6        3. Pour 1.5 pounds of honey, 1 pound of apple concentrate,
- 7            and 0.5 pounds of grape concentrate into a suitably sized
- 8            round stainless steel or plastic container (the mixing
- 9            container) which complies with FDA regulations. (With the
- 10           honey and fruit syrup ingredients in the ratio of 3 to 2
- 11           to 1, the final product tastes like a most delicious
- 12           dried fig product. The seeds in dried figs are very
- 13           crunchy; the whole chia seed in the end product is
- 14           somewhat softer and less crunchy than the seeds in figs;
- 15           nevertheless, the organoleptic properties of the two are
- 16           very similar.)
- 17        4. Pour 2 pounds 2.5 ounces of 104° F (40° C) distilled
- 18           water into the mixing container and stir until the honey,
- 19           apple, and grape concentrates are dissolved.
- 20        5. Pour the carob powder into the container and stir well.
- 21        6. While stirring vigorously, very slowly pour the chia seed
- 22           into the mixing container near its inside wall (no more
- 23           than about 1/300 of an ounce of chia seed per revolution
- 24           of the mixing paddle per square inch of the surface area
- 25           of the mixture in the mixing container), and continue to
- 26           stir vigorously for five minutes.
- 27        7. Allow the batter to set for 30 minutes. (If less water is
- 28           used at Step 4, this 30 minute wait can be reduced corre-
- 29           spondingly, but the batter will be somewhat harder to

- 1 spread at Step 11.)
- 2 8. Place a 19 inch diameter pizza platter on a table.
- 3 9. Place the first or next circular dehydrator screen on the  
4 pizza platter.
- 5 10. Pour 4 pounds of batter onto the screen.
- 6 11. Spread batter evenly around on the screen, avoiding, of  
7 course, the screen's center hole.
- 8 12. Lift the screen with the batter on it, and place it onto  
9 the first or next dehydrator tray. Place another screen  
10 on top of the batter, and invert and fit another  
11 dehydrator tray on top of the dehydrator tray containing  
12 the batter such that the center walls of the two trays  
13 interlock.
- 14 13. Flip this two tray assembly, and remove the top  
15 dehydrator tray and screen.
- 16 14. Place the lower dehydrator tray with the batter on the  
17 dehydrator base unit. Place an empty dehydrator tray on  
18 top of the tray containing the batter. (This provides  
19 additional ventilation.)
- 20 15. Repeat steps 9-14 until all of the batter has been placed  
21 on dehydrator trays, and the trays have been stacked on  
22 the dehydrator base unit. This procedure should yield two  
23 trays of batter.
- 24 16. Place the insulated dehydrator cover on the top tray to  
25 minimize loss of heat during the dehydration process.

1 17. Set the rotary temperature selection dial to indicate a  
2 temperature of 104° F (40° C). Turn on the dehydrator.

3 (An alternate to steps 7-17 above is given in §6.4.2, Method  
4 of Use of Despoked Trays and Screen-Forms. The chief  
5 advantage of this alternate method is it eliminates the  
6 tremendous effort required to spread the batter in step 11  
7 above. The chief disadvantage of this alternate method is  
8 that it means one extra drying surface to be cleaned.)

9 18. Thirty minutes after step 17, slice the drying batter in  
10 each dehydrator tray into 1/4 inch by 1 inch rectangles,  
11 and put the trays back on the dehydrator base unit. (It  
12 is essential that these rectangles be no thicker than 1/4  
13 inch; cracker batter which contains both chia seed and a  
14 sweetener such as honey dries very slowly to a water  
15 activity less than 0.60. If the cracker batter dries too  
16 slowly, yeast and mold formation is encouraged.)

17 19. Every 30 minutes for the next three hours, re-slice the  
18 drying batter in each dehydrator tray into the rectangles  
19 of step 18.

20 20. When the water activity of the drying batter drops to  
21 about 0.70, the batter should now be dry enough that the  
22 screens on which it rests can be removed without tearing  
23 the batter. To do this, proceed as follows: Remove the  
24 insulated dehydrator cover. Invert and fit another  
25 dehydrator tray on the dehydrator tray containing the  
26 batter such that the two trays' center walls interlock.  
27 Flip this two-tray assembly, and remove the top  
28 dehydrator tray and screen. Place the lower dehydrator  
29 tray with the batter back on the dehydrator base unit.  
30 Repeat this for each tray of drying batter. Then replace  
31 the insulated dehydrator cover. Removing the screens will

1 accelerate the drying of the batter.

2 21. Continue to dehydrate the batter until its water activity  
3 has been reduced below 0.60, and preferably below 0.40.  
4 Then place these resultant crackers in a refrigerated  
5 area in which the relative humidity is 0.65, and allow  
6 the crackers to rehydrate until their water activity is  
7 0.65. This rehydration step makes the crackers somewhat  
8 moister and easier to chew. The result is referred to as  
9 remoistened crackers. (But be careful here; if the  
10 relative humidity is allowed to rise above 65%, mold may  
11 form on the crackers.)

12 22. Determine the cross-sectional area and tensile strength  
13 of a typical piece of Carob Flavored Chia Crackers.

#### 14 6.5.2.1.7 Method for Making the Chia Fruit Snack

15  
16 The following method can be used for agglutinating a wide  
17 variety of fruits. According to *How to Dry Foods* by Deanna  
18 DeLong (HPBooks, A division of Price Stern Sloan, Inc., 360  
19 N. LaCienega Blvd., Los Angeles, CA 90048, 1979), some of the  
20 more suitable fruits for dehydration are apples, apricots,  
21 bananas, blueberries, cherries, citrus fruits, coconuts,  
22 cranberries, currants, dates, figs, grapes, melons,  
23 nectarines, papayas, peaches, pears, persimmons, pineapples,  
24 plums, prune plums, rhubarb, and strawberries. So that the  
25 fruits used will not significantly deteriorate during drying,  
26 the fruits must be sliced into sections which are no larger  
27 than ½ inch on a side. Preferably, the fruits should be  
28 sliced into sections which are not larger than 1/4 inch on a  
29 side. Most preferably the fruits used for Chia Fruit Snacks  
30 should be sliced into even smaller pieces or shredded using  
31 the Presto SaladShooter in order to minimize drying time. For  
32 maximum nutritional value, it is further preferred that the



1 batter prepared for these snacks be spread thinly upon  
2 dehydrator screens in order to minimize drying time. The  
3 following snacks are prepared with shredded apples and pears  
4 and diced plums. The CFA for this snack food is 1.00, thus  
5 demonstrating chia seed's agglutinative powers.

6 The steps of this method are as follows:

- 7 1. Utilize a dehumidifier to reduce the relative humidity of  
8 the room in which the product will be made to less than  
9 40%. (If the relative humidity climbs above about 65%,  
10 mold may form on the drying batter.)
- 11 2. Pour 12 oz. of honey into a suitably sized round  
12 stainless steel or plastic container (the mixing  
13 container) which complies with FDA regulations.
- 14 3. Pour 18 oz. of 104° F (40° C) distilled water into the  
15 mixing container and stir until the honey is dissolved.
- 16 4. Assemble the Presto SaladShooter electric shredder/slicer  
17 with the shredder cone, and use it to shred 2 oz. of  
18 apples, and 2 oz. of pears (omitting any inedible skins  
19 or seeds). Dice 2 oz. of plums (omitting the inedible  
20 skin and pits) into quarter inch cubes. Stir the shredded  
21 apples and pears and the diced plums into the mixing  
22 container.
- 23 5. While stirring vigorously, very slowly pour 12 oz. of  
24 certified chemical-free chia seed into the mixing  
25 container near its inside wall (no more than about 1/300  
26 of an ounce of chia seed per revolution of the mixing  
27 paddle per square inch of the surface area of the mixture  
28 in the mixing container), and continue to stir vigorously  
29 for five minutes.

- 1     6. Allow the batter to set for 30 minutes. (If less water is  
2       used at Step 4, this 30 minute wait can be reduced corre-  
3       spondingly, but the batter will be somewhat harder to  
4       spread at Step 10.)
- 5     7. Place a 19 inch diameter pizza platter on a table.
- 6     8. Place a circular dehydrator screen on a pizza platter.
- 7     9. Pour the batter onto the screen.
- 8     10. Spread batter evenly around on the screen, avoiding, of  
9       course, the screen's center hole.
- 10    11. Lift the screen with its batter, and place it on a  
11       dehydrator tray. Place another screen on top of the  
12       batter, and invert and fit another dehydrator tray on the  
13       first dehydrator tray such that the two trays' center  
14       walls interlock.
- 15    12. Flip this two-tray assembly, and remove the top  
16       dehydrator tray and screen.
- 17    13. Place the lower dehydrator tray with the batter on the  
18       dehydrator base unit. Place an empty dehydrator tray on  
19       top of the tray containing the batter. (This provides  
20       additional ventilation.) Place the insulated dehydrator  
21       cover on the top tray to minimize loss of heat from the  
22       dehydrator.
- 23    14. Set the rotary temperature selection dial of the  
24       dehydrator to indicate a temperature of 104° F (40° C).  
25       Turn on the dehydrator.
- 26    (An alternate to steps 6-14 above is given in §6.4.2, Method

1 of Use of Despoked Trays and Screen-Forms. The chief  
2 advantage of this alternate method is it eliminates the  
3 tremendous effort required to spread the batter in step 10  
4 above. The chief disadvantage of this alternate method is  
5 that it means one extra drying surface to be cleaned.)

6 15. Thirty minutes after step 14, slice the drying batter  
7 into 1/4 inch by 1 inch rectangles, and put the tray back  
8 on the dehydrator base unit. (It is essential that these  
9 rectangles be no thicker than 1/4 inch; cracker batter  
10 which contains both chia seed and a sweetener such as  
11 honey dries very slowly to a water activity less than  
12 0.60. If the cracker batter dries too slowly, yeast and  
13 mold formation is encouraged.)

14 16. Every 30 minutes for the next three hours, re-slice the  
15 drying batter into the rectangles of step 15.

16 17. Continue to dehydrate the batter until its water activity  
17 has been reduced below 0.60, and preferably below 0.40.

18 18. Place the tray containing the Chia Fruit Snacks in a  
19 frost-free refrigerator for several hours to allow the  
20 honey in the product to fully congeal. Once the honey  
21 congeals in the cold of the refrigerator, the screens can  
22 be more easily pulled away from the batter. Preferably,  
23 these crackers are left in a refrigerator whose relative  
24 humidity is maintained at 0.65, until the crackers have  
25 rehydrated to a water activity of 0.65. This rehydration  
26 step makes the crackers somewhat moister and easier to  
27 chew. The result is referred to as remoistened crackers.  
28 (But be careful here; if the relative humidity is allowed  
29 to rise above 65%, mold may form on the crackers.)

1 6.5.2.2 Chia Crackers Prepared by the Osmotic Pressure  
2 Differential Establishment Method of Water Activity  
3 Reduction

4 6.5.2.2.1 Method for Making Honey-Sweetened Chia Crackers

5 The addition of a sweet syrup to the batter results in  
6 very strong, flexible crackers with the organoleptic  
7 properties of dried figs (soft yet crunchy, and cohesive). In  
8 the following method, chia seed either absorbs the honey or  
9 holds it very tightly bound to itself. The CFA of these  
10 crackers is 1.00.

11 It should be noted that the more sweet syrup that is used  
12 in the batter, the more slowly the chia seeds will absorb  
13 water from the surrounding batter. If a considerable amount  
14 of water activity depressant is used, one might have to wait  
15 an hour or more for the chia to absorb sufficient water from  
16 the batter for the batter to be spread on screens without  
17 significant leakage through the screen apertures. Of course  
18 if one waits too long, it will be very difficult to spread  
19 the batter on the screens.

20 1. Pour 12 ounces of 104° F (40° C) distilled water into a  
21 suitably sized round stainless steel or plastic container  
22 (the mixing container) which complies with FDA  
23 regulations.

24 2. While stirring vigorously, very slowly pour 6 ounces of  
25 certified chemical-free chia seed into the mixing  
26 container near its inside wall (no more than about 1/300  
27 of an ounce of chia seed per revolution of the mixing  
28 paddle per square inch of the surface area of the mixture  
29 in the mixing container), and stir vigorously for five  
30 minutes. This vigorous stirring further reduces the

1 possibility of the chia seed clumping together, and,  
2 consequently, not being evenly wet by water.

3 3. Spread this chia batter onto a flat level clean surface  
4 so that the batter is no more than 1/4 inch thick.

5 4. Allow this chia seed and water batter to set for 30  
6 minutes in order to allow the chia seed to absorb water  
7 from the batter.

8 5. Slice this batter into two inch squares.

9 6. Immerse these squares into pure undiluted honey, and let  
10 set (in the honey) for 30 minutes to reduce the water  
11 activity of these pieces.

12 7. Remove these crackers and immerse them into new fresh  
13 honey, again letting these crackers set in the honey for  
14 30 minutes.

15  
16 8. Repeat step 7 until the water activity of the crackers  
17 has been reduced below 0.60, and preferably below 0.40.  
18 Then place this product in a refrigerated area in which  
19 the relative humidity is 0.65, and allow the product to  
20 rehydrate until its water activity is 0.65. This  
21 rehydration step makes the product somewhat moister and  
22 easier to chew. (But be careful here; if the relative  
23 humidity is allowed to rise above 65%, mold may form on  
24 the product.)

25 9. Mill the crackers and determine the pH value of a slurry  
26 consisting of 3.0 ounces of distilled water and 0.5  
27 ounces of the milled cracker.

28 6.5.2.2.2 Method for Making Carob Flavored Chia Crackers

1       It has been found that in products containing chia seed,  
2       honey, and, perhaps, a fruit syrup, the taste of the chia  
3       seed is somewhat noticeable (unless the product has been  
4       allowed to age for a few weeks as noted previously). The use  
5       of carob completely and effectively masks the chia seed taste  
6       resulting in very delicious products, with the organoleptic  
7       properties of dried figs (soft yet crunchy, and cohesive).

8       1. Measure out the following ingredients:

- 9       a. 6 ounces of carob powder (Applicant prefers the use of  
10       raw organic certified chemical free carob powder.)  
11       b. 6 ounces of certified chemical-free chia seed

12       2. Pour 6 ounces of honey, 4 ounces of apple concentrate,  
13       and 2 ounces of grape concentrate into a suitably sized  
14       round stainless steel or plastic container (the mixing  
15       container) which complies with FDA regulations. (With the  
16       honey and fruit syrup ingredients in the ratio of 6 to 4  
17       to 2, the final product tastes like a most delicious  
18       dried fig product. The seeds in dried figs are very  
19       crunchy; the whole chia seed in the end product is  
20       somewhat softer and less crunchy than the seeds in figs,  
21       nevertheless, the organoleptic properties of the two are  
22       very similar.)

23       3. Pour 9 ounces of 104° F (40° C) distilled water into the  
24       mixing container and stir well.

25       4. Pour the carob powder into the container, and stir well.

26       5. While stirring vigorously, very slowly pour the chia seed  
27       into the mixing container near its inside wall (no more  
28       than about 1/300 of an ounce of chia seed per revolution  
29       of the mixing paddle per square inch of the surface area  
30       of the mixture in the mixing container), and continue to

- 1 stir vigorously for five minutes.
- 2 6. Spread this chia batter onto a flat level clean surface  
3 so that the batter is no more than 1/4 inch thick.
- 4 7. Allow the batter to set for 30 minutes. (If less water is  
5 used at Step 3, this 30 minute wait can be reduced corre-  
6 spondingly.)
- 7 8. Slice this batter into two inch squares.
- 8 9. Immerse these squares into pure undiluted honey, and let  
9 set (in the honey) for 30 minutes to reduce the water  
10 activity of these squares.
- 11 10. Remove these squares and immerse them into new fresh  
12 honey, again letting these squares set in the honey for  
13 30 minutes.  
14
- 15 11. Repeat step 10 until the water activity of the squares  
16 has been reduced below 0.60, and preferably below 0.40.  
17 Then place this product in a refrigerated area in which  
18 the relative humidity is 0.65, and allow the product to  
19 rehydrate until its water activity is 0.65. This  
20 rehydration step makes the product somewhat moister and  
21 easier to chew. (But be careful here; if the relative  
22 humidity is allowed to rise above 65%, mold may form on  
23 the product.)
- 24 12. Mill the squares and determine the pH value of a slurry  
25 consisting of 3.0 ounces of distilled water and 0.5  
26 ounces of the milled squares.

1     6.5.2.2.3 Method for Making Chia and Sprouted Wheat Crackers

2         This cracker contains both chia seed and the  
3     gluten-bearing ingredient, sprouted wheat. It is, therefore,  
4     a very sturdy product. Slightly more than 1.5\*MAA of chia  
5     seed is used to prepare these crackers, and the CFA for these  
6     crackers is 0.61. This method uses dehydrated sprouted wheat  
7     at step 2. The method for sprouting wheat is well known to  
8     those who are skilled in the art. After the wheat is sprouted  
9     (for about 18 hours), it is then dehydrated at a temperature  
10    of 104° F (40 °C) by methods well known to those who are  
11    skilled in the art.

12    The steps of this method are as follows:

- 13       1. Mill 3.8 ounces of certified chemical-free dehydrated  
14       sprouted wheat.
- 15       2. Measure out the following ingredients:
  - 16           a. 3.8 ounces of certified chemical-free sesame seed
  - 17           b. 6 ounces of certified chemical-free chia seed.
- 18       3. Pour 13.6 ounces of 104° F (40° C) water into a suitably  
19       sized round stainless steel or plastic container (the  
20       mixing container) which complies with FDA regulations.
- 21       4. Pour the milled wheat sprouts into the mixing container  
22       and stir well.
- 23       5. Pour the sesame seed into the mixing container and stir  
24       well.
- 25       6. While stirring vigorously, very slowly the pour chia seed  
26       into the mixing container near its inside wall (no more  
27       than about 1/300 of an ounce of chia seed per revolution



- 1 of the mixing paddle per square inch of the surface area  
2 of the mixture in the mixing container).
- 3 7. Continue to stir the batter vigorously for 5 minutes.
- 4 8. Spread this chia seed batter onto a flat level clean  
5 surface so that the batter is no more than 1/4 inch  
6 thick.
- 7 9. Allow the batter to set for 15 minutes before proceeding.
- 8 10. Slice this batter into two inch squares.
- 9 11. Immerse these squares into pure undiluted honey, and  
10 allow them to set (in the honey) for 30 minutes to reduce  
11 the water activity of these pieces.
- 12 12. Remove these squares and immerse them into new fresh  
13 honey, again allowing these squares to set in the honey  
14 for 30 minutes.
- 15
- 16 13. Repeat step 12 until the water activity of the squares  
17 has been reduced below 0.60, and preferably below 0.40.  
18 Then place this product in a refrigerated area in which  
19 the relative humidity is 0.65, and allow the product to  
20 rehydrate until its water activity is 0.65. This  
21 rehydration step makes the product somewhat moister and  
22 easier to chew. (But be careful here; if the relative  
23 humidity is allowed to rise above 65%, mold may form on  
24 the product.)
- 25 14. Mill the squares and determine the pH value of a slurry  
26 consisting of 3.0 ounces of distilled water and 0.5  
27 ounces of the milled squares.

1 6.5.2.2.4 Method of Extracting an Agglutinant from Whole Chia  
2 Seeds.

3 1. Pour 20 parts of water into the mixing container for each  
4 part of chia seed to be used at step 2.

5 2. While stirring vigorously, very slowly pour one part of  
6 chia seed into the mixing container near its inside wall  
7 (no more than about 1/300 of an ounce of chia seed per  
8 revolution of the mixing paddle per square inch of the  
9 surface area of the mixture in the mixing container).

10 3. Continue to stir the batter vigorously for 5 minutes to  
11 keep the chia seed from clumping.

12 4. Let this mixture set for about an hour to give the seed  
13 coats of the chia seeds enough time to thoroughly  
14 dissolve in the water.

15 5. Pour a portion of chia seed into a kitchen strainer with  
16 smaller openings than the size of a chia seed, and use a  
17 suitably shaped object (such as a bowl or any round  
18 object of suitable size) to force the chia seed against  
19 the strainer openings. A slimy liquid will be forced  
20 through the strainer opening.

21 6. Pour this slimy liquid onto a dehydrator solid sheet and  
22 dehydrate until dry. The result will be a thin  
23 transparent film of chia agglutinant on the dehydrator  
24 solid sheet.

25 7. Scrape this film off the solid sheet, and keep tightly  
26 sealed in a cool, dry place. This film is the chia  
27 agglutinant. Since this agglutinant does not contain chia  
28 seeds, it can be said that any product made with this

1           agglutinant is chia seed-free.

2       6.5.2.2.5 Method of Using the Agglutinant Extracted from  
3           Whole Chia Seeds to Agglutinate a Food Product.

4       Applicant used the agglutinant extracted from whole chia  
5       seeds to agglutinate a carob-water mixture, but this  
6       agglutinant can be used to agglutinate virtually any food  
7       product. The following procedure shows how the agglutinant  
8       can be used to agglutinate a carob-water mixture.

- 9       1. Stir 3 ounces of carob powder into 4 ounces a mixture of  
10       water and chia agglutinant. Trial and error will have to  
11       be used to determine the best ratio of chia agglutinant  
12       to water to obtain the desired degree of hardness of the  
13       end product. (As mentioned in §6.5.1.1 Circumstances of  
14       Conception, Applicant stirred 8 ounces of chia seed into  
15       20 pints of water, separated out 9 ounces of chia  
16       agglutinant, and used 4 of these ounces to make an  
17       agglutinated carob confection.)
- 18       2. Dehydrate the resultant mixture at a temperature of 105° F  
19       (40.6 C) until its water activity is less than 0.60. Since  
20       the resultant product does not contain chia seeds, it can  
21       be said that this resultant product is chia seed-free.

22       6.5.2.2.6 Method of Making Chia Scramblers

23       All of the above methods take from 48 to 60 hours to  
24       complete. There is a need for a method that from start to  
25       finish is complete in 24 hours. The following method for  
26       making Chia Scramblers is unique in that a complete batch of  
27       chia based crackers is complete in about 18 hours. This  
28       method uses dehydrated sprouted wheat and millet at step 6.  
29       The methods for sprouting wheat and millet are well known to

1 those who are skilled in the art. After the wheat and millet  
2 are sprouted (for about 18 hours), the sprouts are then  
3 dehydrated at a temperature of 104° F (40 °C) by methods well  
4 known to those who are skilled in the art.

5 The steps of this method are as follows:

- 6 1. Utilize a dehumidifier to reduce the relative humidity of  
7 the room in which the product will be made to less than  
8 40%. (If the relative humidity climbs above about 65%,  
9 mold may form on the drying batter.)
- 10 2. Heat eight pounds of honey at a temperature of 115 F (46 C)  
11 for 30 minutes to reduce its viscosity. Measure out the  
12 following ingredients:
  - 13 a. 6 pounds of certified chemical-free carob powder
  - 14 b. 10 pounds of chia seed
  - 15 c. 3 pounds of dehydrated sprouted wheat
  - 16 d. 3 pounds of dehydrated sprouted millet
- 17 3. Pour the 8 pounds of honey from step 2 into a suitably  
18 sized round stainless steel or plastic container (the  
19 mixing container) which complies with FDA regulations.
- 20 4. Pour 10 pounds of 104° F (40° C) distilled water into the  
21 mixing container and stir until the honey is dissolved.  
22 By using only 10 pounds of water here, a very thick  
23 batter is made, and this batter has little water in  
24 comparison to the amount of chia seed being used. The ten  
25 pounds of chia seed being used in this method will  
26 normally absorb twelve times as much water as is being  
27 used. With this method the weight of the water used can  
28 be equal to or slightly less than the weight of the chia  
29 seed used. Thus there is not much water to remove during  
30 the dehydration step, and the batter can be very quickly  
31

- 1        dehydrated to a water activity of less than 0.66.
- 2        5. Mix the 3 pounds of dehydrated sprouted wheat with the 3
- 3        pounds of dehydrated sprouted millet.
- 4
- 5        6. Mill the mixture of dehydrated sprouted wheat and millet.
- 6
- 7        7. Pour the milled sprouts into the mixing container, and
- 7        stir well.
- 8
- 9        8. Pour the carob powder into the mixing container and stir
- 9        well.
- 10       9. While stirring vigorously, very slowly pour the chia seed
- 11       into the mixing container near its inside wall (no more
- 12       than about 1/300 of an ounce of chia seed per revolution
- 13       of the mixing paddle per square inch of the surface area
- 14       of the mixture in the mixing container), and continue to
- 15       stir vigorously for another five minutes. This mixture
- 16       constitutes the cracker batter.
- 17       10. Allow this batter to set until it is sufficiently stiff
- 18       (about ten minutes) that it can be easily spread but
- 19       without running to any degree. During this time, the chia
- 20       seed slowly absorbs water from the batter making the
- 21       batter very firm.
- 22       11. Place the batter on a large smooth hard clean cutting
- 23       surface, and spread it to a thickness of about 1/4 inch.
- 24       12. Slice the batter into approximately ½ inch by two inch
- 25       rectangles. The shortest dimension of a rectangle should
- 26       not be larger than ½ inch so that the center of the
- 27       rectangle will dry quickly.

- 1 13. Place a circular dehydrator screen in a dehydrator tray.
- 2 14. Place a sufficient number of  $\frac{1}{2}$  inch by two inch  
3 rectangles on the circular screen in the dehydrator tray  
4 leaving at least 1/16th of an inch between pieces (for  
5 proper ventilation) until the rectangles are one level  
6 deep in the tray.
- 7 15. Place this dehydrator tray on the dehydrator base unit.  
8 (If this is the second or beyond dehydrator tray to be  
9 loaded with batter slices then there is already at least  
10 one tray on the dehydrator base unit. In this case, stack  
11 this tray on top of the last tray placed thus forming a  
12 stack of trays on the dehydrator base unit.)
- 13 16. Repeat steps 13-15 until all of the batter has been  
14 placed on dehydrator trays. Place the insulated  
15 dehydrator cover on the top tray to minimize heat loss  
16 during the dehydration process.
- 17 17. Set the rotary temperature selection dial of the  
18 dehydrator base unit to indicate a temperature of 104° F  
19 (40° C). Turn on the dehydrator.
- 20 18. About 16 hours after step 17, the water activity of the  $\frac{1}{2}$   
21 by 2 inch rectangles should be less than 0.65, and the  
22 rectangles can be refrigerated till ready to be used or  
23 packed.
- 24 19. Then place these resultant crackers in a refrigerated  
25 area in which the relative humidity is 0.65, and allow  
26 the crackers to rehydrate until their water activity is  
27 0.65. This rehydration step makes the crackers somewhat  
28 moister and easier to chew. The result is referred to as  
29 remoistened crackers. (But be careful here; if the

1 relative humidity is allowed to rise above 65%, mold may  
2 form on the crackers.)

### 3 6.6 VERIFICATION OF PRODUCT VITALITY

4 In order to demonstrate that Applicant's products have not  
5 been processed at such temperatures and times which would  
6 damage the vitality of my products, he presents a method for  
7 determining what he calls the Thermal Damage Coefficient,  $D$ ,  
8 of a product. During the making of a food product, it is  
9 subjected to various temperatures for various lengths of  
10 time. A plot could be made of temperature versus time which  
11 would show how temperature varied over time during the  
12 processing of the food product. Essentially, the Thermal  
13 Damage Coefficient of a product is a measure of the degree to  
14 which the seeds in that product would fail to sprout or have  
15 their sprouting capability diminished due to thermal damage  
16 if, prior to sprouting them, they had been held in water  
17 whose temperature variations over time were the same as  
18 occurred in the process which produced the food product. For  
19 a completely undamaged product,  $D$  is zero. For a completely  
20 damaged product,  $D$  is one. A product with a Thermal Damage  
21 Coefficient near zero means that the product has not been  
22 significantly affected by heat, and, unless it was subjected  
23 to other destructive influences, it still possesses the bulk  
24 of its valuable nutrients. A product with a Thermal Damage  
25 Coefficient near 1.0 has had most of its valuable nutrients  
26 damaged or destroyed by heat. It is the better part of wisdom  
27 to avoid such products.

28 For those food products whose preparation involved holding  
29 them at a substantially constant elevated temperature (i.e.,  
30 in excess of 30° C) for a continuous period of time, the  
31 Thermal Damage Coefficient can be determined as follows:

- 1 (1) Let  $R_t$  be the length of the time period during which the  
2 product was exposed to an elevated temperature (i.e., a  
3 temperature in excess of  $30^\circ \text{C}$ ). (Temperatures below  $30^\circ \text{C}$   
4 are not known to damage any of the known nutrients in food.)
- 5 (2) Let  $T_e$  be the elevated temperature to which the product  
6 was subjected.
- 7 (3) Compute Elevated Temperature Soak Time,  $R_e$ , as the lesser  
8 of  $R_t$  and 8 hours.
- 9 (4) Compute Room Temperature Soak Time:  $R_o = 8 \text{ hours} - R_e$
- 10 (5) Carefully select  $n_t$  ( $n_t \geq 40$ ) plump seeds which are not  
11 damaged, discolored, or shriveled. Soak these seeds in  
12 distilled water in a sealed thermally conductive container  
13 for  $R_e$  hours at a temperature of  $T_e$ . (The container is sealed  
14 to prevent evaporation and resultant cooling.)
- 15 (6) At the end of  $R_e$  hours, continue to soak the seeds for a  
16 further  $R_o$  hours at a temperature of  $20\text{--}30^\circ \text{C}$  (i.e., room tem-  
17 perature).
- 18 (7) Between the start of step 5 and the end of step 6, the  
19 seeds will have soaked for a total of 8 hours.
- 20 (8) Carefully select a second lot of  $n_t$  (same as the  $n_t$  of  
21 step 5) plump seeds from the same batch as was used in step 5  
22 which are not damaged, discolored, or shriveled. Soak these  
23 seeds in distilled water in a sealed thermally conductive  
24 container for eight hours at a temperature of  $30^\circ \text{C}$ . (Again,  
25 the container is sealed to prevent evaporation and resultant  
26 cooling.)
- 27 (9) Sprout the seeds of step 7 for 48 hours. Let  $n_e$  be the



1 number of seeds out of  $n_t$  which sprout.

2 (10) Sprout the seeds of step 8 for 48 hours. Let  $n_r$  be the  
3 number of seeds out of  $n_t$  which sprout.

4 (11) Compute  $D$  for this product as follows:

5 
$$D = (1/n_r) * (n_r - n_e) \pm 2/n_t$$

6 (By definition, a product which was never subjected to a  
7 temperature greater than 30° C has a Thermal Damage  
8 Coefficient of 0.)

## 9 6.7 EXAMPLES

10 A number of examples of products made by the above methods  
11 will now be given. Please note that the pH readings given in  
12 these examples were obtained with an analog pH meter with a  
13 resolution of 0.1 pH. In those cases where the meter needle  
14 fell between two tenths markings, Applicant has attempted to  
15 give his best estimation of the reading.

16 In each of the Examples of this section, the value of  $pH_f$   
17 (pH final) is an actual measured value. Unless indicated  
18 otherwise, however, the value of  $pH_o$  (pH initial) is an  
19 estimated value based on Applicant's previous work with these  
20 materials. Such estimated values will be reasonably close to  
21 actual measured values inasmuch as the pH of unsoured seeds  
22 and unsoured sprouted grains ranges from about 6.0 to about  
23 6.5, depending on the type of seed or grain.

24 Using the methods described in the "Description of  
25 Preferred Method to Manufacture Invention" section of this  
26 application, the products of Applicant's invention were made.  
27 In order that one may more easily correlate the results he

1 obtained with the steps of his method, Applicant lists the  
2 steps that had measurable outputs and the results obtained  
3 for those steps:

4 Example 1

5 Plain Chia Crackers were made by the method shown in  
6 §6.5.2.1.1, "Method for Plain Chia Crackers". The cross-  
7 sectional area and tensile strength of a typical cracker were  
8 measured. Then the pH of a slurry made from milled crackers  
9 and distilled water was measured. This slurry was then  
10 dehydrated in order to investigate the degree of souring  
11 which can be expected when crackers are made with milled chia  
12 seed instead of whole chia seed. The resultant dried product  
13 was milled, and a slurry consisting of 1 part milled product  
14 and 6 parts distilled water was prepared. The pH value of  
15 this slurry was then measured. The results of these  
16 measurements are shown below.

| 17 | Step | Results Obtained  |
|----|------|---|
| 18 | 4    | $\text{pH}_o$ (actual) = 6.5.   |
| 19 | 16   | Cross-sectional area: 0.397 sq. in. It required a                         |
| 20 |      | force of 150 ounces to pull the cracker apart. Hence                      |
| 21 |      | the tensile strength of this piece is 377.8 oz. per                       |
| 22 |      | sq. inch.   |
| 23 | 17   | $\text{pH}_f = 6.5$ . Thus, $\delta\text{pH}_{LA} = 6.5 - 6.5 = 0$ .      |
| 24 | 18   | $\text{pH}_f = 5.16$ . Thus, $\delta\text{pH}_{LA} = 6.5 - 5.16 = 1.34$ . |

25 Although these crackers are completely gluten-free, it took  
26 over 9 pounds of force to pull them apart. Remarkably, the  
27 tensile strength of these plain chia crackers is  $377.8/303.1$   
28  $= 1.24$  times greater than the tensile strength of Nabisco's

1 Low Salt Triscuit<sup>®</sup> Whole Wheat Wafers. (Please see Example 4  
2 below.)

3 Example 2

4 Honey-Sweetened Chia Crackers were made by the method  
5 shown in §6.5.2.1.5, "Method for Making Honey or  
6 Syrup-Sweetened Chia Crackers". The cross-sectional area and  
7 tensile strength of a typical cracker were measured and the  
8 results are shown below.

| 9  | <u>Step</u> | <u>Results Obtained</u>                                |
|----|-------------|--|
| 10 | 19          | Cross-sectional area: 0.279 square inches. It required |
| 11 |             | a force of 158 ounces to pull the cracker in two.      |
| 12 |             | Hence, the tensile strength of this piece is 566.3 oz. |
| 13 |             | per sq. inch.  |

14 Example 3

15 Carob Flavored Chia Crackers were made by the method shown  
16 in §6.5.2.1.6, "Method for Carob Flavored Chia Crackers". The  
17 cross-sectional area and tensile strength of a typical  
18 cracker were measured and the results are shown below.

| 19 | <u>Step</u> | <u>Results Obtained</u>                                |
|----|-------------|--|
| 20 | 22          | Cross-sectional area: 0.216 square inches. It required |
| 21 |             | a force of 139 ounces to pull the cracker in two.      |
| 22 |             | Hence, the tensile strength of this piece is 643.5 oz. |
| 23 |             | per sq. inch.  |

24 Example 4

25 Rice crackers were made by the method of Baker shown in

1 the Summary of Invention, Objects and Advantages Section of  
2 this application in order to investigate the tensile strength  
3 and pH value of crackers made by the closest known background  
4 art method. The crackers developed large cracks during the  
5 dehydration process strongly suggesting that the amount of  
6 ground chia seed used was insufficient to bind together the  
7 gluten-free ground rice sprouts therein. One cracker with a  
8 cross-sectional area of 0.570 square inches withstood 6  
9 ounces of force before breaking. The tensile strength of this  
10 piece is therefore only 10.53 ounces per square inch. Another  
11 piece with a cross-sectional area of 0.279 square inches  
12 withstood 10 ounces of force before breaking. The tensile  
13 strength of this piece is therefore 35.84 ounces per square  
14 inch. Due to the large cracks in the product, widely  
15 divergent measurements are to be expected. As a rough measure  
16 of chewability, a new Quikut Stainless Steel Knife (U.S. Pat.  
17 No. 2,973,578, assigned to Quikut Division of the Scott &  
18 Fetzer Co., Fremont, Ohio, 43240) was used to slice the  
19 cracker, and the force needed to slice the cracker was  
20 measured. It took between 7 and 9 pounds of force to slice  
21 the various crackers made by the method of Baker. A slurry  
22 was then prepared consisting of 0.5 ounces of milled rice  
23 cracker and 3.0 ounces of distilled water. The pH value of  
24 this slurry was 4.66.

25 It was then decided to select a widely known reference  
26 cracker for comparison purposes. Nabisco's Low Salt Triscuit<sup>R</sup>  
27 Whole Wheat Wafers, being popular among those with an  
28 above-average concern for health, was selected. The  
29 ingredients are: whole wheat, partially hydrogenated soybean  
30 oil, and salt. A Triscuit<sup>R</sup> cracker with a cross-sectional area  
31 of 0.254 square inches withstood a stretching force of 77  
32 ounces before breaking. The tensile strength of this piece is  
33 therefore 303.1 ounces per square inch. And it took 146  
34 ounces (= 9 pounds 2 oz.) of force to slice this cracker

1 using the Quikut knife. A slurry was made from 0.5 ounces of  
2 ground up Low Salt Triscuit<sup>R</sup> Whole Wheat Wafers and 3.0 ounces  
3 of water. The pH value of this slurry was measured and was  
4 found to be 6.20. Inasmuch as these crackers were prepared at  
5 a high temperature, no souring was expected.

6 Next, rice crackers were made by the methods of this  
7 application. No cracks at all developed in the crackers as  
8 they were dehydrating, suggesting that the amount of whole  
9 chia seed used was adequate. A cracker with a cross-sectional  
10 area of 0.243 square inches withstood 14 ounces of force  
11 before breaking. The tensile strength of this piece is  
12 therefore 57.61 ounces per square inch. As a rough measure of  
13 chewability, a new Quikut Stainless Steel Knife was used to  
14 slice the cracker, and the force needed to slice the cracker  
15 was measured. It took about 14 pounds of force to slice the  
16 various crackers made by Applicant's method. A slurry was  
17 then prepared consisting of 0.5 ounces of Applicant's milled  
18 rice crackers (0.35 inches thick) and 3.0 ounces of distilled  
19 water. The pH value of this slurry was 5.0. The pH of a very  
20 thick cracker (0.93 inches thick) was also measured and was  
21 found to be 4.88. (The extra thickness lengthens drying time  
22 and thus the time to reduce water activity below 0.60, thus  
23 providing extra time for bacterial souring to occur.)

#### 24 6.8 THERMAL DAMAGE COEFFICIENT COMPARISONS

25 The Thermal Damage Coefficient of Applicant's products  
26 will now be compared with the Thermal Damage Coefficient of a  
27 product whose process includes dehydration at 125° F (52° C)  
28 for eight hours. It will be shown that the ingredients in  
29 Applicant's product have not had their vitality damaged by  
30 the temperatures and times of the process which made the  
31 product whereas products prepared at 125° F (52° C) have had  
32 their vitality damaged. The Relative Numbers method was used

1 to compute the Thermal Damage Coefficient of Applicant's  
2 products as follows:

- 3 (1) During their processing, these products were exposed to  
4 the temperature of 104° F (40° C) for periods of time in  
5 excess of 8 hours. (Thus,  $R_t$  is greater than 8 hours.)
- 6 (2) Therefore the elevated temperature of exposure,  $T_e$ , is  
7 104° F (40° C).
- 8 (3) Elevated Temperature Soak Time,  $R_e$ , is 8 hours.
- 9 (4) Room Temperature Soak Time,  $R_o$ , = 8 hours -  $R_e$  = 0.
- 10 (5) 40 chia seeds were soaked in distilled water in a sealed  
11 container (to prevent evaporation) for 8 hours at a  
12 temperature of 104° F (40° C).
- 13 (6) A second lot of 40 seeds from the same batch of chia seed  
14 was soaked for eight hours at 30° C.
- 15 (7) The seeds of step 5 were sprouted for 48 hours. 29 of the  
16 40 seeds sprouted. Therefore,  $n_e$  = 29.
- 17 (8) The seeds of step 6 were sprouted for 48 hours. 29 of the  
18 40 seeds sprouted. Therefore,  $n_r$  = 29.
- 19 (9)  $D$  was computed for this product as follows:  
20 
$$D = (1/n_r) * (n_r - n_e) \pm 2/n_t = 0.00 \pm 0.05 = 0.00 \text{ to } 0.05.$$

21 The Relative Numbers method was used to compute the Ther-  
22 mal Damage Coefficient of a product whose process included  
23 dehydration for 8 hours at 125° F (52° C) as follows:

- 24 (1) The elevated temperature of exposure,  $T_e$ , is 125° F  
25 (52° C).
- 26 (2) Elevated Temperature Soak Time,  $R_e$ , is 8 hours.
- 27 (3) Room Temperature Soak Time,  $R_o$ , = 8 hours -  $R_e$  = 0.
- 28 (4) 40 chia seeds were soaked in distilled water in a sealed  
29 container (to prevent evaporation) for 8 hours at a  
30 temperature of 125° F (52° C).
- 31 (5) The seeds of step 4 were sprouted for 48 hours. None of  
32 the 40 seeds sprouted. Therefore,  $n_e$  = 0.
- 33 (6) From step (8) above (the sprouting of chia seeds which

1 had been soaked in 30° C water for 8 hours),  $n_r$  is 29.

2 (9)  $D$  was computed for this product as follows:

3 
$$D = (1/n_r) * (n_r - n_e) \pm 2/n_t = 1.00 \pm 0.05 = 0.95 \text{ to } 1.00.$$

4 Therefore it can be concluded that a temperature of 125° F  
5 (52° C) for eight hours is injurious to the sprouting  
6 capability of chia seeds whereas a temperature of 104° F  
7 (40° C) for 8 hours is not injurious to the sprouting  
8 capability of chia seeds.

9 The below table summarizes the results obtained in  
10 determining the Thermal Damage Coefficients of various  
11 products:

| 12 | <u>Soak Water Temperature</u> | <u>No. Out of 40 Sprouting</u> | <u><math>D</math></u> |
|----|-------------------------------|--------------------------------|-----------------------|
| 13 | 70° F (21 C)                  | 29                             | —                     |
| 14 | 104° F (40 C)                 | 29                             | 0.00 to 0.05          |
| 15 | 125° F (52 C)                 | 0                              | 0.95 to 1.00          |

16 The above discussions, definition of  $D$ , and results are the  
17 basis of Applicant's claim that the products of this  
18 invention have a  $D$  of less than 0.2.

## 19 6.0 CONCLUSION, RAMIFICATIONS, AND SCOPE OF INVENTION

20 Thus the reader will see that the products of this  
21 invention have many advantages over the products of the  
22 background art.

23 First, Applicant's invention introduces slightly  
24 germinated whole chia seed as the ideal agglutinant for  
25 making all kinds of snack products:

26 a. This agglutinant is nonpasteurized.

27 b. It does not need to be ground to be easily chewed which

1 not only involves extra time and expense but also  
2 exposes the interior nutrients to the deleterious  
3 effects of oxidation.

4 c. It is not subject to the souring action of lactic acid  
5 bacteria.

6 d. It does not contain gluten to which many people are  
7 sensitive, yet contributes to holding the products it  
8 enters into together so as to make them convenient  
9 snack foods.

10 e. It is rich in nutrition.

11 f. It does not need to be cooked to be eaten.

12 g. By quickly firming up the batter in which it is used,  
13 it can be thickly spread on dehydrator screens thus  
14 facilitating the production of large quantities of the  
15 product.

16 h. After the other ingredients have been thoroughly mixed  
17 together in a thin slurry (having low viscosity and  
18 being so easily stirred that energy expense is at a  
19 minimum), it can then be added, and will then quickly  
20 thicken the batter so that the batter can now be spread  
21 upon dehydrator screens without leaking through. All of  
22 Applicant's chia crackers rely heavily on this most  
23 unusual property of chia seed—after all other  
24 ingredients have been thoroughly stirred together in a  
25 fairly thin easy-to-stir slurry, whole chia seed is  
26 added to quickly thicken the batter so that it can now  
27 be spread on dehydrator screens rather than on  
28 dehydrator solid sheets, thus resulting in large  
29 quantities of a very nutritious product with tremendous  
30 energy savings.

31 i. It is at least slightly germinated. This leads to a  
32 slight increase in enzymatic activity within the seed  
33 and a slight decrease in enzyme inhibitors.

34 Therefore, the products made with this agglutinant exhibit



1 many desirable qualities:

- 2 1. These products hold together well.
- 3 2. These products utilize a gluten-free agglutinant which  
4 does not sour, needs only to be slightly germinated, and  
5 does not need to be milled into flour. The savings in time  
6 and added expense are very significant.
- 7 3. Those of Applicant's products which are gluten-free are  
8 suitable for those who must follow a gluten-free diet. As  
9 has been shown above, for the first time not only have  
10 unsweetened products been produced with CFA values in  
11 excess of 0.6, but with values ranging all the way up to  
12 1.00 (i.e., completely gluten-free).
- 13 4. The agglutinant is unsoured. Since the chia seed is not  
14 ground into a paste or a flour which would expose the  
15 inner portion of the seed to lactic acid bacteria, it does  
16 not sour during the dehydration process which produces the  
17 final product. Further since chia seed quickly absorbs all  
18 available water during the preparation process, this water  
19 is kept from those ingredients with a tendency to sour,  
20 thus greatly retarding the souring of those ingredients.
- 21 5. These products are of excellent and uniform appearance.  
22 They are not disfigured by the ugly cracks which ruin the  
23 appearance of the background art products.
- 24 6. These products can be made very thick. Therefore, there  
25 are fewer dehydrator screens to be cleaned for a given  
26 weight of end product.
- 27 7. The final product does not stick to the screens on which  
28 it was dried; hence, no oil is required in product  
29 preparation.
- 30 8. When a sweet syrup and carob powder are included in the  
31 product batter, the resultant product has the organoleptic  
32 properties of dried figs.

33 Second, Applicant's invention introduces an agglutinant

1 obtained from slightly germinated whole chia seed as an ideal  
2 agglutinant for making all kinds of snack products:

- 3 a. This agglutinant is nonpasteurized.
- 4 b. It is not subject to the souring action of lactic acid  
5 bacteria.
- 6 c. It does not contain gluten to which many people are  
7 sensitive, yet contributes to holding the products it  
8 enters into together so as to make them convenient  
9 snack foods.
- 10 d. It does not need to be cooked to be eaten.

11  
12 Therefore, the products made with this agglutinant exhibit  
13 many desirable qualities:

- 14 1. These products hold together well.
- 15 2. These products utilize a gluten-free agglutinant which  
16 does not sour.
- 17 3. Those of Applicant's products which are gluten-free are  
18 suitable for those who must follow a gluten-free diet.
- 19 4. The agglutinant is unsoured. Since the chia seed is not  
20 ground into a paste or a flour which would expose the  
21 inner portion of the seed to lactic acid bacteria, the  
22 agglutinant derived therefrom does not sour during the  
23 dehydration process which produces the final product.

24 Applicant wishes to close this description by pointing out  
25 a fact which the reader may not have fully appreciated. The  
26 definition of pH given by "Webster's Third New International  
27 Dictionary of the English Language Unabridged" (G&C Merriam  
28 Co, Springfield, Mass, 1961) is: "the negative logarithm of  
29 the effective hydrogen-ion concentration or hydrogen-ion  
30 activity in gram equivalents per liter . . . and used for  
31 convenience in expressing both acidity and alkalinity usually  
32 on a scale of 0 to 14 on which 7 represents the value for

1 pure water at 25° C or neutrality . . ." Gram equivalent is  
 2 defined as "the quantity of a chemical element . . . which  
 3 has a weight in grams equal to the equivalent." A gram  
 4 equivalent of hydrogen weighs 1 gram. Therefore, let:

5  $\alpha_H$  = effective hydrogen-ion ( $H^+$ ) concentration in grams per  
 6 liter.

7 Then  $pH = -\log_{10}\alpha_H$ , and  $\alpha_H = 10^{-pH}$  grams/liter =  $10^{6-pH}$   
 8 mg/kiloliter

9 From the above considerations, the following table can be  
 10 constructed:

| 11 | <u>pH</u> | <u>Mg of <math>H^+</math> per Kiloliter</u> |
|----|-----------|---|
| 12 | 7.0       | 0.1000 (neutrality)                         |
| 13 | 6.5       | 0.3162                                      |
| 14 | 6.4       | 0.3981                                      |
| 15 | 6.3       | 0.5012                                      |
| 16 | 6.2       | 0.6310                                      |
| 17 | 6.1       | 0.7943                                      |
| 18 | 6.0       | 1.0000                                      |
| 19 | 5.9       | 1.2589                                      |
| 20 | 5.8       | 1.5849                                      |
| 21 | 5.7       | 1.9952                                      |
| 22 | 5.6       | 2.5119                                      |
| 23 | 5.5       | 3.1623                                      |
| 24 | 5.4       | 3.9810                                      |
| 25 | 5.3       | 5.0119                                      |
| 26 | 5.2       | 6.3096                                      |
| 27 | 5.16      | 6.9183                                      |
| 28 | 5.1       | 7.9433                                      |
| 29 | 5.0       | 10.0000                                     |
| 30 | 4.9       | 12.5893                                     |
| 31 | 4.88      | 13.1826                                     |

|   |           |  |
|---|-----------|--|
| 1 | <u>pH</u> | <u>Mg of H<sup>+</sup> per Kiloliter</u> |
| 2 | 4.8       | 15.8489                                  |
| 3 | 4.7       | 19.9526                                  |
| 4 | 4.66      | 21.8776                                  |
| 5 | 4.6       | 25.1189                                  |
| 6 | 4.5       | 31.6228                                  |

7 NOTE: gm/liter = 10<sup>6</sup> mg/kiloliter

8 The pH of a 6:1 slurry prepared from slightly germinated  
9 chia seed is 6.5 which represents 0.3162 mg of H<sup>+</sup> per  
10 kiloliter. Slightly germinated chia seed does not contain  
11 lactic acid. Therefore this value of 0.3162 mg of H<sup>+</sup> per  
12 kiloliter is due solely to the other components of the  
13 slightly germinated chia seed. It can therefore be said that  
14 0.3162 mg of H<sup>+</sup> per kiloliter is the value expected for a 6:1  
15 slurry of slightly germinated chia seed. It is therefore the  
16 value expected for a 6:1 slurry prepared from a slightly  
17 germinated chia seed product which does not contain any  
18 lactic acid. So we will call this value of 0.3162 mg of H<sup>+</sup> per  
19 kiloliter the value which would be obtained if a completely  
20 unsoured slightly germinated chia seed product were made.  
21 Then any difference between this value and the value obtained  
22 for a soured product would be due to the lactic acid content  
23 of the soured product.

24 NOTE: As discussed in §4.1 of this specification, the pH  
25 value of a product containing chia seed is defined as the pH  
26 value of a 6:1 slurry prepared from that product. Similarly,  
27 the pH value of a batter from which the product is to be made  
28 is defined as the pH value of a slurry consisting of six  
29 parts water and 1 part the solids of that batter (i.e.,  
30 enough water is to be added to the batter so that the water  
31 inherent in the batter plus added water would be six times  
32 the weight of the solids in the batter).

1 In preparing the Plain Chia Crackers of Example 1, a  
2 batter was prepared consisting of whole chia seed and water.  
3 This batter exhibited a pH value of 6.5 which corresponds to  
4 0.3162 mg of  $H^+$  per kiloliter. Since this batter does not  
5 contain any lactic acid (no souring having yet taken place),  
6 the 0.3162 mg of  $H^+$  per kiloliter is solely due to the natural  
7 properties of whole chia seed. After dehydration of this  
8 batter, the resultant product exhibited a pH value of 6.5  
9 which again corresponds to 0.3162 mg of  $H^+$  per kiloliter.  
10 Therefore no lactic acid whatsoever formed in the product as  
11 it dried.

12 Plain Chia Crackers were then prepared from a batter  
13 consisting of ground chia seed and water instead of whole  
14 chia seed and water. This batter exhibited a pH value of 6.5  
15 which corresponds to 0.3162 mg of  $H^+$  ions per kiloliter. Since  
16 this batter does not contain any lactic acid (no souring  
17 having yet taken place), the 0.3162 mg of  $H^+$  per kiloliter is  
18 solely due to the natural properties of the as-yet unsoured  
19 ground chia seed. After dehydration of the batter, the  
20 resultant product exhibited a pH of 5.16. From the above  
21 table, it can be seen that this pH value corresponds to  
22 6.9183 mg of  $H^+$  per kiloliter. Therefore the lactic acid which  
23 formed in these crackers made from ground chia seed and water  
24 as they dried has contributed  $6.9183 - 0.3162 = 6.6021$  mg of  
25  $H^+$  per kiloliter which, being excessive, causes these crackers  
26 to taste sour. From 6.6021 mg per kiloliter (for crackers  
27 made from ground chia seed and water) to 0.0 mg per kiloliter  
28 (for crackers made from whole chia seed and water) is a  
29 decrease in acidity of 100 percent. In other words, a batter  
30 of ground chia seed and water sours considerably during the  
31 long dehydration process which results in the final product.  
32 And that is why products prepared with whole chia seed taste  
33 so good, and products prepared with ground chia seed taste  
34 somewhat sour and bitter.

1 The rice crackers made according to the method of Baker  
2 (Example 4 of S6.7), the closest known background art,  
3 exhibited a pH value of 4.66 ( $\text{pH}_f$ ). From the above table, it  
4 can be seen that this pH value corresponds to 21.8776 mg of  $\text{H}^+$   
5 per kiloliter. The pH of the batter from which these crackers  
6 were to be made is estimated to be 6.0 ( $\text{pH}_0$ ). From the above  
7 table, this pH corresponds to 1.0 mg of  $\text{H}^+$  per kiloliter.  
8 Since the batter from which these crackers were to be made  
9 does not contain any lactic acid (no souring having yet taken  
10 place), the 1.0 mg of  $\text{H}^+$  per kiloliter is solely due to the  
11 natural properties of this batter. Therefore the lactic acid  
12 which formed in crackers made by the method of Baker as they  
13 dried has contributed  $21.8776 - 1.0 = 20.8776$  mg of  $\text{H}^+$  per  
14 kiloliter which, being excessive, causes these crackers to  
15 taste sour. On the other hand, the rice crackers prepared by  
16 the method of Applicant, exhibited a pH of 5.0. From the  
17 above table, it can be seen that this pH value corresponds to  
18 10.0 mg of  $\text{H}^+$  per kiloliter. The pH of the batter from which  
19 Applicant's crackers were to be made is estimated to be 6.0  
20 ( $\text{pH}_0$ ). From the above table, this pH corresponds to 1.0 mg of  
21  $\text{H}^+$  per kiloliter. Since the batter from which Applicant's  
22 crackers were made does not contain any lactic acid (no  
23 souring having yet taken place), the 1.0 mg of  $\text{H}^+$  per  
24 kiloliter is solely due to the natural properties of this  
25 batter. Therefore the lactic acid which formed in Applicant's  
26 product as it dried is responsible for the  $10.0 - 1.0 = 9.0$   
27 mg of  $\text{H}^+$  per kiloliter of the final product. From 20.8776 mg  
28 per kiloliter (due to lactic acid in Baker's crackers) to 9.0  
29 mg per kiloliter (due to lactic acid in Applicant's crackers)  
30 is a decrease in acidity due to lactic acid souring of more  
31 than 56 percent. And that is why the products prepared with  
32 whole chia by the methods of Applicant's invention taste so  
33 good, and products prepared from ground chia by the closest  
34 background art taste somewhat sour and bitter.

1       The foregoing descriptions of specific embodiments of the  
2       present invention have been presented for the purposes of  
3       illustration and description. They are not intended to be  
4       exhaustive or to limit the invention to the precise  
5       forms disclosed, and obviously many modifications and  
6       variations are possible in light of the above teaching. The  
7       embodiments were chosen and described in order to best  
8       explain the principles of the invention and its practical  
9       application, to thereby enable others skilled in the art to  
10      best utilize the invention and various embodiments with  
11      various modifications as are suited to the particular use  
12      contemplated. It is intended that the scope of the  
13      invention be defined by the Claims appended hereto and their  
14      equivalents. While the present invention has been described  
15      in terms of preferred embodiments and generally associated  
16      methods, the inventor contemplates that alterations and  
17      permutations of the preferred embodiments and method  
18      will become apparent to those skilled in the art upon a  
19      reading of the specification and a study of the drawings. For  
20      example, this invention can also be used to make cookies,  
21      pretzels, crackers, and biscuits. This invention can be used  
22      to agglutinate apples, celery, dates—in short any fruit,  
23      vegetable, seed, or sprout, which is first divided into  
24      pieces not larger than about one inch on each side. For a  
25      further example, although Applicant's preferred method  
26      utilizes a dehydrator to reduce the water activity of these  
27      product, other equipment and methods could also be used alone  
28      or in combination with one another, such as spray drying,  
29      utilization of reverse osmosis, vacuum chamber drying,  
30      dehumidification equipment, ultrafiltration equipment, sun  
31      drying, foam-mat drying, tower drying at low temperatures in  
32      dehumidified air, and using a high-speed fan at room  
33      temperature.

34       Accordingly, the above description of preferred exemplary

1   embodiments does not define or constrain the present  
2   invention. Rather, the issued claims variously define the  
3   present invention. Each variation of the present invention is  
4   limited only by the recited limitations of its respective  
5   claim, and equivalents thereof, without limitation by other  
6   terms not present in the claim. Further, aspects of the  
7   present invention are particularly pointed out below using  
8   terminology that the inventor regards as having its broadest  
9   reasonable interpretation; the more specific interpretations  
10   of 35 U.S.C. section 112(6) are only intended in those  
11   instances where the term "means" is actually recited.

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